

IOWA

SCALE OF MILES

0 5 10 20 30 40

Population of places is indicated by different lettering thus;

35,000 and over DES MOINES

20,000 to 35,000 Burlington

5,000 to 20,000 Cedar Falls

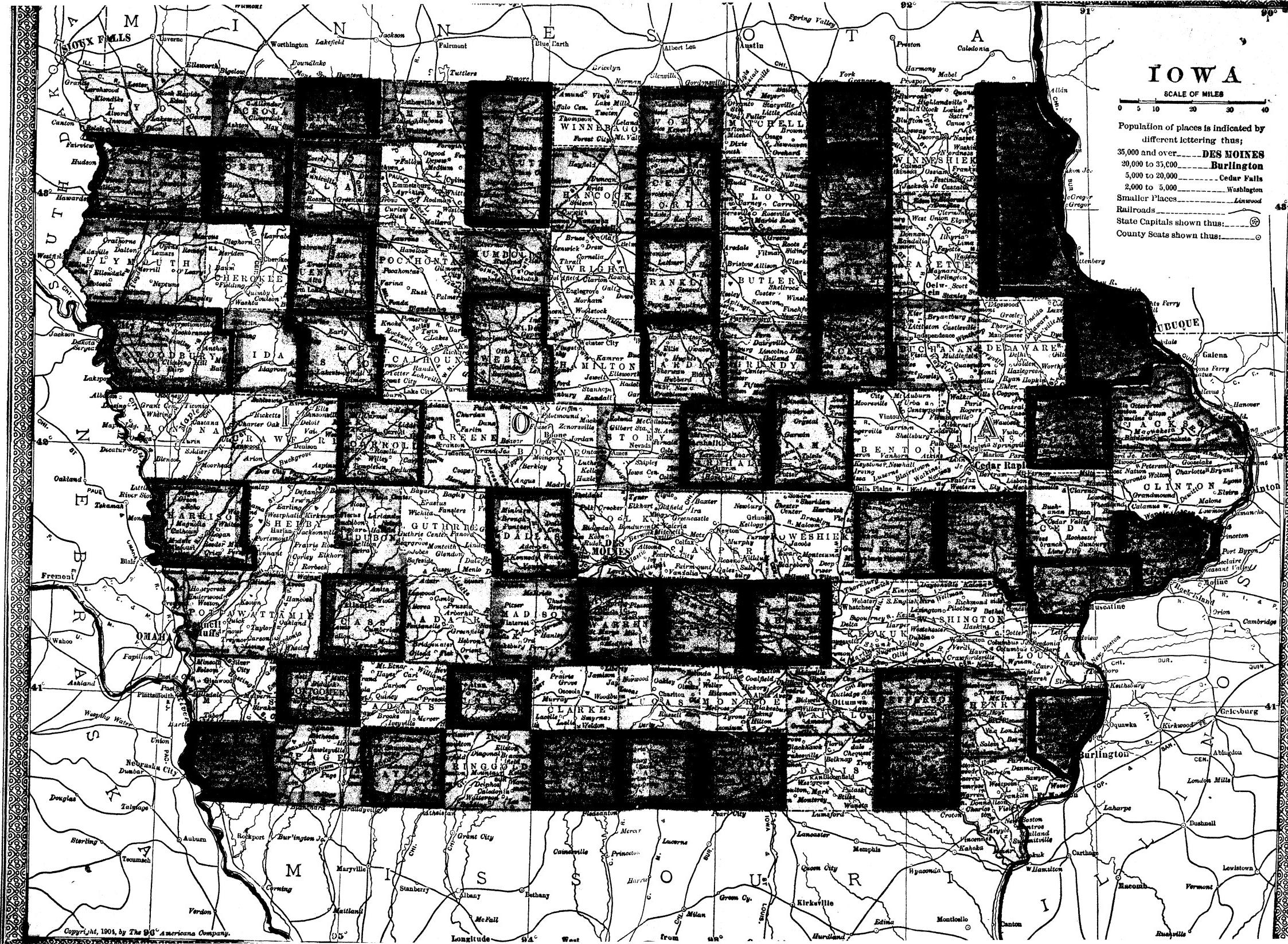
2,000 to 5,000 Washington

Smaller Places Linwood

Railroads

State Capitals shown thus:

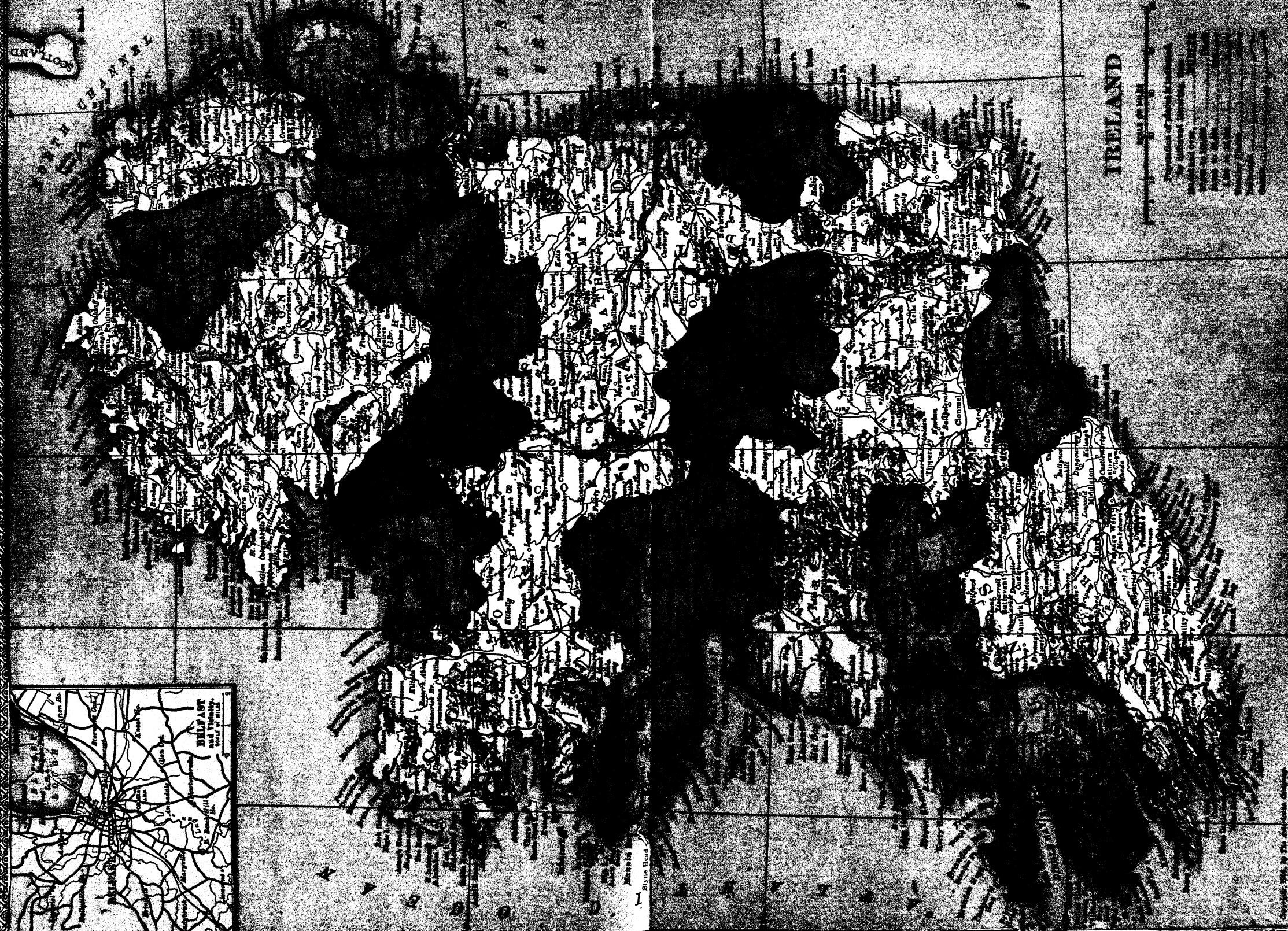
County Seats shown thus:

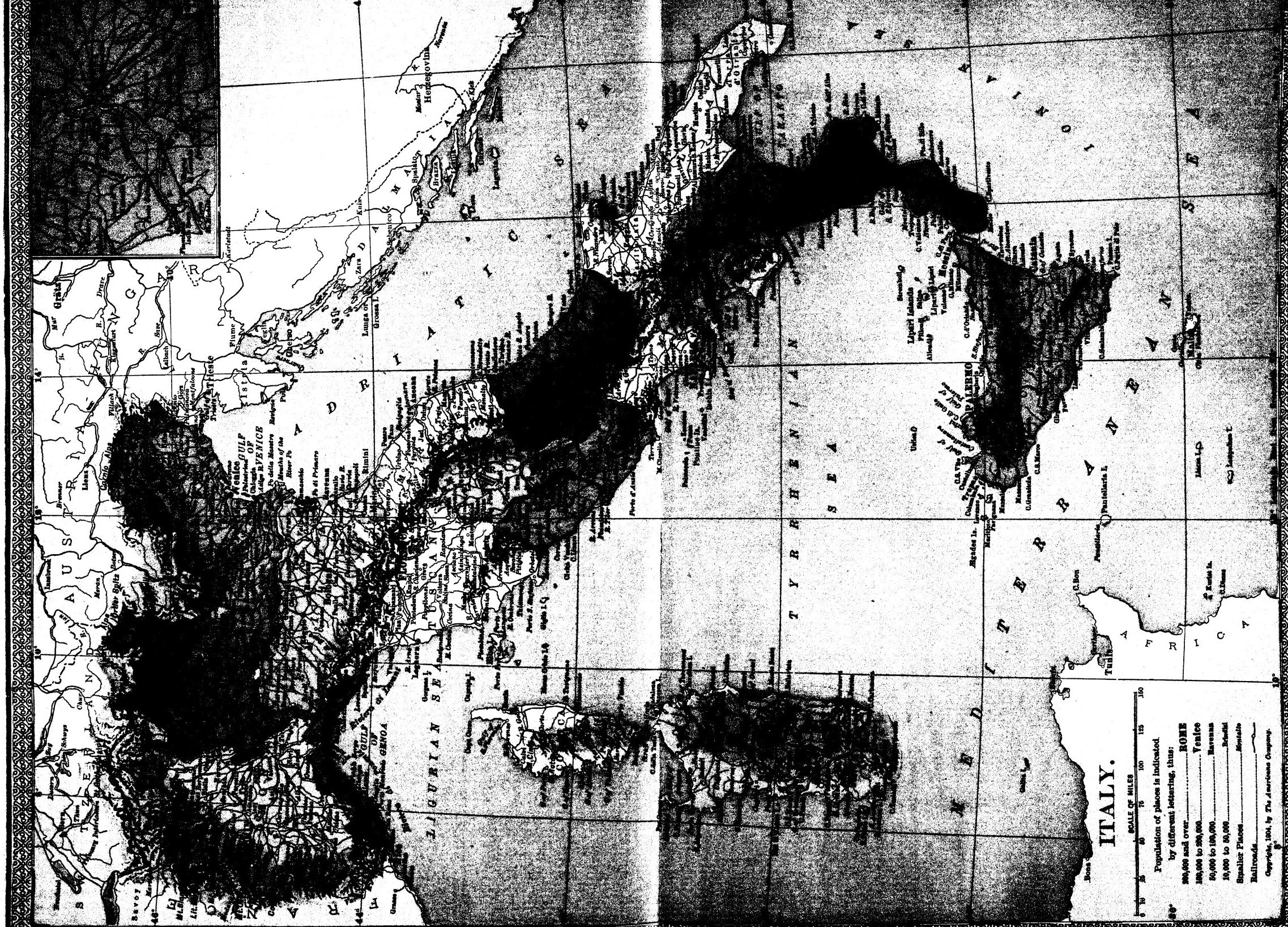


IRELAND

Scale 1:1,000,000

Population of Ireland
in 1901
and
1911





THE ENCYCLOPEDIA AMERICANA

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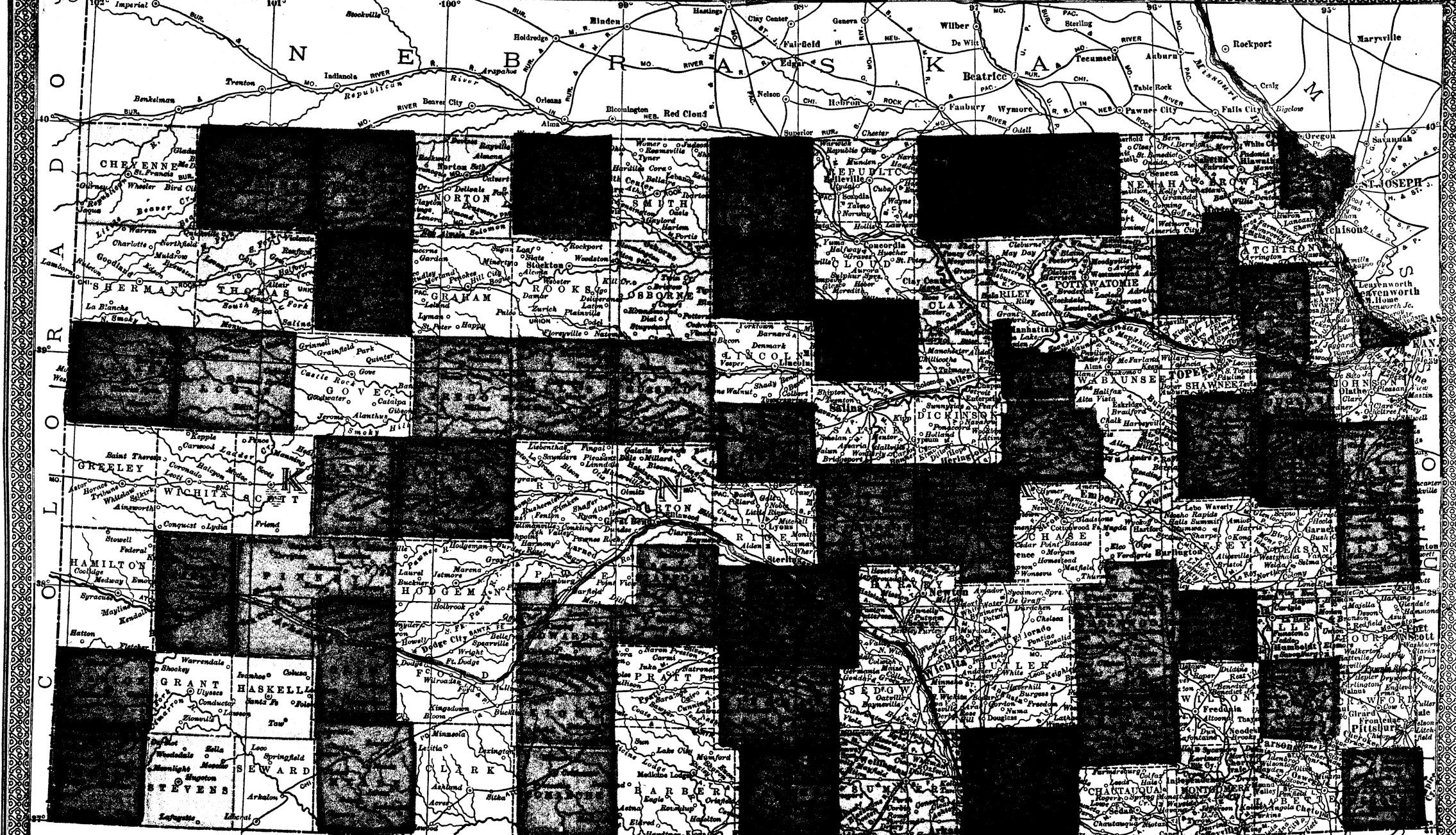
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KANSAS

SCALE OF MILES

0 5 10 20 30 40 50

Population of places is indicated

by different lettering, thus:

25,000 and over	TOPEKA
5,000 to 25,000	Emporia
1,000 to 5,000	Peabody
500 to 1,000	Summerfield
Smaller Places	Charleston
State Capitals shown thus	•
County Seats shown thus	○
Railroads	—

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LEADING ARTICLES
IN VOLUME NINE

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and Vicinity

SCALE OF MILES

0 ½ 1 2 3 4



KEY TO PRONUNCIATION.

ä	far, father	ñ	Span. ñ, as in <i>cañon</i> (căñ'yōn), <i>píñor</i> (pēñ'yōn)
å	fate, hate	ng	mingle, sing ng
a or ä	at, fat	nk	bank, ink
â	air, care	ö	no, open
ä	ado, sofa	o or ö	not, on
à	all, fall	ô	corn, nor
ch	choose, church	ó	atom, symbol
é	eel, we	ø	book, look
e or é	bed, end	oi	oil, soil; also Ger. eu, as in <i>bewöl</i>
é	her, over: also Fr. e, as in <i>de</i> ; eu, as in <i>neuf</i> ; and oe, as in <i>boeuf</i> . coeur; Ger. ö (or oe), as in <i>ökonomie</i> .	ö or oo	fool, rule
é	befall, elope	ou or ow	allow, bowsprit
é	agent, trident	s	satisfy, sauce
ff	off, trough	sh	show, sure
g	gas, get	th	thick, thin
gw	anguish, guava	fh	father, thither
h	hat, hot	ü	mute, use
h or h	Ger. ch, as in <i>nicht</i> , <i>wacht</i>	u or ü	but, us
hw	what	ú	pull, put
i	file, ice	ü	between u and e, as in Fr. sur, Ger. Müller
i or ī	hum, it	v	of, very
î	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din	y	(consonantal) yes, young
j	gem, genius	z	pleasant, rose
kw	quaint, quite	zh	azure, pleasure
ñ	Fr. nasal m or n, as in <i>embonpoint</i> , <i>Jean</i> , <i>tempis</i>	' (prime), " (secondary)	accents, to indicate syllabic stress

THE ENCYCLOPEDIA AMERICANA

Indian, Education of the. Indian education as at present conducted in the United States is in no way the outcome of any deliberate plan on the part of the Federal government, but is directly descended from the first attempts to teach the Indians of Virginia, and particularly from like beginnings in Massachusetts, where the remarkable results of John Eliot (q.v.) were achieved.

Eliot's Work.—Eliot was actuated by high motives, and his simple measures were chosen with consummate wisdom. Having familiarized himself with the language, disposition, and character of his Indians, he secured their confidence and respect. Those who would follow him he gathered in towns, where he taught them the liberties and responsibilities of township government and the devices and institutions of civilized life, among which the Church and the school naturally occupied places of honor. A number of "choice Indian youths" he induced to attend English schools that they might prepare themselves for missionary work among their own people. He was warmly supported by "the corporation for the propagation of the Gospel in foreign parts," by the General Court of Massachusetts, and particularly by Daniel Gookins, the official superintendent of the Indians in Massachusetts. Eliot began his work in 1646. In 1674 there were 14 towns of "praying Indians," whose schools and churches, in the majority of instances, were administered by educated natives, and an Indian college had been founded at Cambridge. Yet in due time this success was swept away by the fears and prejudices which developed under the baneful influences of the Indian wars. Similar successful work under the direction of John Cotton and Richard Bourne in Plymouth colony shared the same fate.

Other Endeavors.—Followers of Eliot in the 18th century were John Sergeant at Stockbridge, Mass., and Eleazer Wheelock in Connecticut and New Hampshire. The work of Sergeant, which involved the establishment of day schools, of a boarding-school, and an experimental "outing system," was almost ideal in con-

ception, but ended with the deportation of his Indians to the West. Dr. Wheelock's labors led to the establishment of an effective training school and, indirectly, to the creation of Dartmouth College "for the education and instruction of youths of the Indian tribes in this land in reading, writing, and all parts of learning which shall appear necessary and expedient for civilizing and christianizing the children of pagans, as well as in all liberal arts and sciences, and also of English youths and any others." Only the last purpose was destined to achievement.

Surviving Influences.—But in spite of external failure, the spirit and much of the form of these early enterprises persisted. Their impress is observable to-day in almost every prominent feature of the Indian-school organization of the United States, notably in the establishment of day schools in or near Indian villages as a means of domestic and industrial uplifting of Indian family and village life; of industrial boarding-schools in territory occupied by Indians, to introduce among the young a taste for the refinements, duties, and responsibilities of civilization; of advanced training-schools in civilized English-speaking communities for the fuller equipment of "choice Indian youths" for full citizenship in such communities, or for missionary work in the ideals, institutions, and arts of civilization among their own people. It is seen in the universal stress in all schools upon instruction in husbandry, certain trades and domestic arts; in the "outing system," which places partially educated Indian girls and boys as paid helpers in suitable English-speaking families, and affords them instruction in the ordinary public schools; and in the importance attached to religious and ethical training.

Wrong Departures.—On the other hand, it is to be deplored that a number of valuable features of the early schools have been abandoned, and even supplanted by opposite tendencies—the unintelligent warfare against the Indian idiom; the introduction of certain brutalities of military discipline; an equally mistaken effort to wean Indian youth from Indian association by throwing contempt upon the Indian and by stimulating a feeling akin to hatred

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of Indian family ties; and in general a policy of compulsion and repression, rather than a spirit of development and benevolent helpfulness. Serious harm came to government schools because patronage entered as a factor in the appointment of officers and employees. Thanks to the Indian Rights Association, the Mohonk Conference, and a number of other societies, in 1893 civil-service rules were applied to employees of the Indian schools.

History of Organization.—The successive steps in the organization of Indian schools have been as follows: After the Revolution little heed was paid to Indian education for 30 years. Only minor appropriations are recorded on the basis of treaties with a few tribes. But in the first quarter of the 19th century a religious revival directed attention to Indian education as a Christian and national duty. Congress responded in 1819 with an appropriation of \$10,000 in addition to certain treaty obligations. In 1820 the President was authorized to apply this sum annually in aid of societies and individuals engaged in the education of Indians. In 1823 \$80,000 was expended in 21 schools maintained by missionary bodies, \$12,000 having been granted by the government. In 1825 the number of such schools had risen to 38, their entire expenditure to \$202,000, of which the government, directly and indirectly, had contributed \$25,000. In 1848 there were reported in operation 16 manual-training schools, 87 boarding-schools and other schools. These schools continued to increase in number and efficiency up to 1873, under the control of missionary bodies, with scanty aid from the government, which had established only a few small day schools directly under treaty provisions. After 1873, however, the government entered upon an era of great activity in the establishment of strictly government schools. In 1877 Congress appropriated for schools outside of treaty provisions, \$20,000; in 1880, \$75,000; in 1885, \$992,800; in 1890, \$1,364,568; in 1895, \$2,060,695; in 1899, \$2,638,390; in 1900, \$2,936,080; 1901, \$3,083,403.65; 1902, \$3,251,254; 1903, \$3,531,220. The expenditures have doubled within the decade, and trebled within 15 years. During the quarter century the average attendance rose in more than like ratio. Increased appropriations naturally stimulated a desire on the part of the government to control expenditures. Moreover, the Constitution, by implication, at least, forbids the appropriation of public funds for denominational purposes. Conclusions unfavorable to government support of missionary schools were further strengthened by the fact that the Roman Catholic Church had gradually outstripped the Protestant missionary bodies and was absorbing the lion's share of government support. In 1893 the Methodist Episcopal Church withdrew from participation in government aid, but without abandoning its schools. In 1895 this example was followed by the Presbyterians and Congregationalists; in 1896 by the Friends; and in 1897 by the remaining Protestant denominations. This left only the Catholics in the field with an appropriation, and in 1901 it was withdrawn from them also. In 1894 Congress had declared its policy of abandoning all support of denominational schools, and this policy has gradually been followed out.

The Schools of To-day.—The present Indian schools under government control are day

schools, reservation boarding-schools, non-reservation boarding-schools, and industrial and normal training-schools. These in 1902 numbered 249, with an enrollment of 24,434 pupils; 323 other pupils were maintained by contract at Hampton and in white public schools.

Day Schools.—Day schools in Indian villages, or near Indian camps or settlements, are, as a rule in charge of a male teacher and his wife, or, as in the pueblos of New Mexico and in the Indian villages of southern California, of a white woman teacher and an Indian house-keeper. These teachers are employed for 10 months in the year; the male teacher's wife acts as housekeeper. The children spend 5 to 8 hours during the 5 days of the week under the care of these employees, and return to their homes in the evening. The instruction is of the simplest character. The children are taught to speak, read, and write English within narrow limits, to cipher, to draw, and to sing. They get some rudimentary notions of geography, of natural history, and of United States history. The methods are borrowed largely from the kindergarten and from object-teaching, and much stress is laid upon habits of cleanliness and order, mutual kindness, and prompt obedience. The boys receive some instruction in the use of tools, in gardening, and in some instances in the care of cows. The girls are taught sewing, cooking, and other arts of housekeeping. In the poorer Indian communities a noon-day lunch of a few simple articles is furnished. While these day schools accomplish comparatively little in conventional school-room work, they serve as concrete illustrations of a civilized Christian home which the Indians learn to respect and, in an appreciable degree, to emulate. Moreover, they reconcile the Indian with the idea of sending his children to school, and render him more willing in due time to entrust them to the care of boarding-schools, as well as more ready to appreciate and to accept the lessons of civilization. The most successful of 134 such schools in 1902, were located in Wisconsin, North Dakota, and South Dakota; the least successful, probably, among the pueblos of New Mexico, where the Indians live in a state of half-civilization which they owe to their Mexican and Spanish antecedents, and which fully satisfies their ideals.

Reservation Boarding-Schools.—There were 90 of these in 1902, averaging 125 pupils. They are in charge of a superintendent, assisted by a matron and such teachers, industrial and domestic helpers as the capacity and character of the school may require. In addition to regular teachers, the school is provided with a cook, a seamstress, and a laundress, whose office it is not only to supervise their respective departments, but also to instruct the girls in these arts. For instruction of the boys there is a farmer, an industrial teacher, and, at larger schools, a tailor, a shoe and harness maker, a carpenter, and a blacksmith. An experiment to provide for more methodical instruction in the use of tools, by expert manual-training teachers, failed because the Indian office would not afford a salary for this position sufficient to attract competent men. In 1894 the experiment of connecting kindergartens with these schools was tried, and proved eminently successful. At the present time there are 40 kindergartens connected with boarding-schools, and the use of kindergarten

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methods and material has entered the primary classes in practically all these schools with similar good results. In the kindergarten the children spend from $1\frac{1}{2}$ to 2 hours each half-day. In most of the other schools children spend half a day in the school-room, and the other half-day in domestic or industrial work of a character suited to their age. Experience has proved that half-day instruction, at first forced upon the schools as an expedient, is commended by its good results.

The aim of the school-room work is to teach reading and writing within the usual limits of primary work; arithmetic for the needs of ordinary daily life; rudimentary geography and United States history; drawing and singing; the laws of hygienic living; garden and orchard work; and familiarity with the simpler requirements of agricultural and domestic industries suited to the locality. Moreover, in a few of the larger schools, the older boys have much opportunity to acquire skill in carpentry, blacksmithing, tailoring, and shoemaking. These institutions are to the children not only school, but home and community. The institution gives them shelter, food and clothing; it accustoms them to habits of cleanliness and decency; it cultivates their aesthetic tastes; it labors to secure right moral attitude, and in its Sunday-school seeks to stimulate the religious life of the children. The superintendent of the reservation boarding-school is subject in his work to the control of the Indian agent, who as representative of the government, administers the reservation's affairs. Inasmuch as these agents are selected on partisan grounds, usually at the suggestion of local politicians, this arrangement is fraught with danger to these schools.

In 1893, under civil-service regulations, there came some improvement. Still with reference to minor employees the superintendents, and even the Indian office, were powerless, and frequently good superintendents were forced out of service by combinations against them among the appointees of the agent, or through the aid and influence of unscrupulous partisan inspectors or supervisors. But in 1896 all employees of the school service were placed under civil-service protection, and since that time there has been marked improvement in the conditions and work of these schools. To a certain degree these evils still persisted, however, because of the power and political bias of the agents; but of late the government has adopted the policy of replacing the agents with bonded school superintendents, 22 agencies now being under such control. There has been decided gain in the equipment, in the sanitary condition, in the general character of employees, and in the conduct of the schools. For the Indian office, relieved of attention to office-seekers and their patrons, has been enabled to pay increased attention to the schools themselves. In the reservation boarding-schools instruction continues through 40 weeks; but often some children are kept at the school throughout the year.

Non-Reservation Boarding-Schools.—Of these there are 25. Seven of them are industrial training-schools, and three others are industrial and normal training-schools. The remaining 15, in their original scope of work, differed little from the reservation boarding-schools. But the superintendents of these schools are bonded and directly responsible to the Indian office. There

is no intervening Indian agency, and the consequent sense of responsibility and self-respect in the head of the school finds its reflection in the attitude of his subordinates, as well as in that of the pupils. These schools are, as a rule, located at a distance from the Indian country, and in the vicinity of American towns which afford contact with the amenities of civilized life. Members of many different tribes are also brought together, and tribal antagonisms are broken down. The pupils are older than those at reservation schools, and some have had previous training in day schools or reservation boarding-schools. Because far away from their Indian homes, and near to English-speaking communities, they gain a better control of English; class-room work reaches far into the advanced grammar-school courses of study, with special stress upon language practice, arithmetic, geometry, geography, history, nature study, drawing, and civil government. Instruction in domestic and industrial arts is made effective by frequent opportunities directly to observe their practical applicability and value. The superintendents are paid from \$1,200 to \$1,500 per annum. Other employees are paid on the same scale as in reservation schools. The most noted and successful of these schools are located at Flandreau, S. D.; Pipestone, Minn.; Mount Pleasant, Mich.; Fort Mojave, Ariz.; Carson, Nev.; Perris, Cal.; Tomah, Wis.; Wittenberg, Wis.; Fort Lewis, Colo.; and Pierre, S. D.

Industrial Training-Schools.—There are schools of this class at Carlisle, Pa.; Chemawa, near Salem, Ore.; Chiocco, Okla.; Genoa, Neb.; Albuquerque, N. M.; Lawrence, Kan. (the Haskell Institute), Grand Junction, Colo.; Santa Fe, N. M.; Phoenix, Ariz.; Fort Shaw, Mont. The most strenuous effort is now carried on at Chiocco; organized 1884; a large plant with a capacity of over 500 pupils, and a fine farm of about 9,000 acres. In organization these schools are similar to the schools just described, but in the scope of their work and in equipment they excel in a high degree. The government in 1894 added normal departments at Carlisle, at the Haskell Institute, and at Santa Fé. The experiment proved fairly successful with Carlisle and the Haskell Institute, at Santa Fé slightly so for a time, but of late it has shown better results there.

Contract Schools.—In addition to maintaining these strictly government schools, the Indian office up to 1901, as before said, paid by contract for the education of many hundreds of Indian pupils distributed in Catholic mission boarding-schools, in Catholic day schools; at Lincoln Institute, Philadelphia, and at Hampton Institute, Hampton, Va. In the appropriation for that year, the aid was withdrawn from all but the last-named, where 120 pupils were contracted for. Besides these, the government since 1891 has endeavored to place Indians in white public schools where there are many whites and few Indians, as the most rapid means of civilization. The antagonism of local or State authorities to this coeducation has made this plan a failure in some places; in others there has been some success. Rising from 8 to 45 between 1891 and 1896, the number of such schools has gradually sunk to 16 in 1902, with 110 pupils contracted for out of 189 enrolled, and average attendance of 98.

INDIAN AFFAIRS

Supervision.—Direction of the Indian schools rests with the Indian office, which is under the supervision of the secretary of the interior. In the Indian office the details of the work are entrusted to the education division, to which all reports are made, and by which all directions and orders are drafted and issued. The education division is aided in its work by the superintendent of Indian schools and by 5 supervisors, assigned in their work to 5 districts respectively. These officials constitute a branch of the Indian-school service which occupies a very uncertain position. They have duties, but no rights. A similarly anomalous relation exists between the commissioner and the secretary of the interior with regard to all matters which the latter may wish to control directly. For this purpose the secretary has established under his direct control an Indian division, independent of the Indian office, to which all orders and directions the secretary may designate must be referred by the Indian office for approval. The power of this Indian division is further reinforced by a corps of inspectors in the field, appointed on partisan grounds, and responsible to him alone. Technically the superintendent of Indian schools may appeal from the commissioner to the secretary of the interior, and the commissioner from the decision of the secretary to the President. In view, however, of the hopelessly autocratic relation that runs through the chain, that is practically out of the question. Under these conditions, the fact that Indian education has prospered reflects credit upon all concerned.

Schools of Indian Territory.—The schools of the so-called "five civilized tribes" of Indian Territory are not included in the above sketch. The 5 tribes in 1900 included 25,639 Cherokees, 10,321 Choctaws, 7,963 Creeks, 5,872 Chickasaws, and 1,662 Seminoles. In addition there were in the Territory 36,853 freedmen and 302,680 whites. Missionary zeal availed itself promptly of this field for its efforts. Substantial boarding-schools were erected, more particularly by the Presbyterians, Methodists, and Baptists. In due time, however, the Indian authorities began to make appropriations for these schools. Ultimately they took entire charge of them. Unfortunately, administrative affairs were largely in the hands of whites, who, by intermarriage or bribery, had been adopted into the tribes, and there came over the schools, as well as over all other public interests, the blight of extreme partisanship and nepotism, which rapidly degraded them in character and efficiency. In 1808 the government at Washington assumed supervisory control over the affairs of all these tribes except the Seminoles. The conduct of the schools and orphan asylums in the 4 tribes involved was placed under the direction of a superintendent of schools in Indian Territory, appointed by the secretary of the interior. Under him there is for each of the tribes or nations a supervisor of schools, whose duty it is to inspect the educational institutions in his district, and to assist in their organization and conduct. The superintendent reports to the commissioner of Indian affairs at Washington through the United States inspector for the Indian Territory, who is his immediate superior. The initial report of this superintendent showed in the 4 tribes 24 boarding-schools, with an enrollment of 1,758 pupils, and an average attendance of 1,480, taught and cared for by 234 employees

at an annual expense of \$236,824. This does not include 363 neighborhood schools, in which more than 10,000 children are taught at an annual expense of \$113,380, which, in character and equipment, show great inferiority.

WILLIAM N. HAILMANN,
Ex-Supt. Indian Schools.

Indian Affairs. The prevalent idea that the national government has always striven to dispossess the Indians from the lands they occupied, or has sympathized with such efforts, is the exact reverse of the truth. From its foundation until now, its history presents an unbroken record of quarrels between Indians and bordering or interdwelling white settlers, in which the government has been slowly and reluctantly pushed on to interfere; sympathizing with and justifying the Indians against its own citizens, its commissioners usually reporting in their favor, and even its generals in later days blaming the whites for the troubles; its courts deciding in their favor; attempting pacification amid local outrages against them, rebuffing appeals for aid, and only using its armies to reduce the Indians and its administrative power to remove them when it was no longer politically possible to leave them in possession. Even then, it has meant to deal righteously by them; but the complexity of the problem — one may say its insolubility till the country was very strong and the Indians very weak — along with the universal curse of "spoils" in the administration — has hindered success. While until 1887 there was no consistently formulated plan, there has been a sequence of government panaceas in a steadily descending line. First, there was to be one vast Indian reservation, large enough to give them all the hunting-room they needed, and so far from the United States that our growth would never reach to them and create more troubles; then three great reservations, to prevent so formidable an Indian district and internecine Indian wars; then a number of small ones, to segregate hopelessly hostile tribes, enable better training into civilized existence, and protect them from depredations; lastly, no reservations, but severalty ownership and individual citizenship. These changes of policy have been due not to fickleness or visionary causes, but to broadening experience and varying conditions.

The policy of removing the Indians west of the Mississippi was first formulated by Jefferson, who in a proposed constitutional amendment (1803) set off the Louisiana Purchase north of the Arkansas as a pure Indian country, in which no land was to be sold to whites. This was carried out, on a much reduced scale, in the formation of Indian Territory (q.v.) by act of 30 June 1834; by another act of same date a superintendent of Indian affairs was appointed, no one to trade or settle in the Indian country without permission from him or his agents. Previous to this the Indian matters had been under the War Department; in 1849 they were transferred to the new Department of the Interior, of which they still form a bureau. Under the commissioner of Indian affairs are eight inspectors and a large variety of subordinate officials and employees. The Indian agents, though under his control, are appointed by the President, for four years, with bonds; on their

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action depends often peace or war to great white populations, but in too many cases they have been the football of politics, and sometimes scandalously unfit for their places.

The legal theory, until a recent date, was that each tribe was a nation, but not a foreign nor independent one; a "domestic dependent nation," but with which, nevertheless, all intercourse was to be conducted through special commissioners appointed by the President. In 1871 Congress abolished this method of procedure, and substituted immediate Congressional control, but the fiction of Indian nations remained; nor, indeed, could any other system well be applied so long as the Indians were recognized as national wards, and could not be made a part of the regular republican system or thrown into the current of unrestricted competition. It was the general plan to let the larger and better advanced ones, as the five "nations" of the Indian Territory, govern themselves and thus develop political life, including a full judiciary system. But the smaller ones could not be thus left, even in leading-strings; and in all, the government has recognized its duty to watch over their ignorance, improvidence, and savage instability of will and emotion from either violence or cunning on the part of the whites. Traders with them must have certificates of good character and be licensed by the Indian commissioner, and the goods they sell are subject to regulation; no one can hunt, cut timber, or pasture cattle on Indian lands without the agent's permission; intoxicating liquors may not be sold to them. Still more important and beneficial is the educational work, which has not only been carried on by churches, missionary societies, and private individuals from early times, but has been actively forwarded by the government. The five civilized nations of Indian Territory had their own school system, of considerable extent; but for others, and even for those where needed, the President was empowered in 1865 to appoint instructors of Indian children in reading, writing, arithmetic, and agriculture, and in 1882 to appoint an inspector of Indian schools. (See INDIAN EDUCATION OF THE.)

From 1877, when a \$20,000 appropriation was made for Indian schooling, to 1900, when over \$3,000,000 was appropriated, over \$35,000,000 had been thus expended by the government. It has spent since its foundation nearly \$400,000,000 on the Indians, outside of the cost of wars against them; and the present expenditure is about \$10,000,000 a year. In 1900 it was maintaining over 45,000 wholly by rations, and 12,500 partly, at a cost of about \$1,250,000 per annum; and paying annuitants (partly from trust funds derived from sales of their lands) over \$1,500,000.

On 8 Feb. 1887, however, an act was passed, amended in 1890, to sweep away as soon as feasible all this system of tutelage and pauperization, in the belief that abolition was best for Indians and whites alike. All reservations were to be surveyed; all Indians who wished to take up lands in severalty to a certain amount might do so—and by the act become citizens, as well as all who had previously done so under treaties and Congressional enactments, over 10,000 in number. Up to 30 Oct. 1900 6,736,514 acres had been so allotted, to 56,996 Indians; about 2,000

a year comply with the permission; and a few years will see an end of Indian tribes except as historical reminiscences. Many of these new citizens are made voters by their States: there are over 20,000 such in the United States at present. See CHEROKEE; CHEROKEE NATION v. GEORGIA.

Indian Art. In none of the fine arts except architecture have the Hindus attained much eminence. Their paintings are of very little merit, though the walls of temples, of palaces, and of the better class of private dwellings are often ornamented at great cost with pictures illustrating the characters and events of their mythology. More attention has been paid to sculpture than to painting, and in the temples cut from the living rock great numbers of statues are contained, some single figures and others large groups. Many of these are bold and spirited in design, though the human form is not exhibited in good proportion nor with its parts well developed.

Indian Architecture, however, comprehends a great variety of styles, among which we may distinguish, as the most important, the Buddhist, the Jaina, the Dravidian or Southern Indian, the Chalukyan, and the Modern Hindu or Indian-Saracenic styles. The history of Indian architecture commences in the 3d century B.C. with the religious buildings and monuments of the Buddhists. Among the principal forms of Buddhist architecture are first, the *topes*, *stupas*, or towers built to mark some sacred spot, and the *dagobas*, constructions of a similar nature, containing relics of Buddha or Buddhist saints. These buildings generally consist of a circular stone basement, varying from 10 or 12 to 40 feet in height, and from 40 to 120 feet in diameter, on which rose a rounded domical structure, generally of brick or small stones laid in mud, the whole edifice rising sometimes 50, sometimes 100 feet high. Second, the rock-cut *chaitya* halls or churches, and the *viharas* or monasteries. Most of these are found in Bombay; some also in Bengal and Behar. In rock-cut buildings architectural skill is confined to the façade and the interior. Among the most notable for beauty of design are those at Ajanta, and, finest and largest of all, the great *Chaitya* cave at Karli, near Bombay, the date of which is probably about 80 B.C. Another interesting example is at Ellora. The Jaina style is a development or corruption of the pure Buddhist. It is characterized by the square or polygonal court, the twelve-pillared dome, the slenderness and elegance of the columns, the horizontal arch, the *sikras* or towers surmounting the cells containing the images, and, lastly, by the peculiar grouping of many temples together on hill-tops. Prominent examples of Jaina architecture are found at Girnar in Gujerat, and at Mount Abu. The most flourishing epoch of the Dravidian style comprises the 16th, 17th, and even 18th centuries of our era. To this late period belong the great temples at Tanjore, Tiruvalur, etc. The distinctive parts of a Dravidian temple are the *vimana* or temple proper, with storied pyramidal roof; the *mantapas* or porches, covering the door which leads to the cell; the *gopuras* or gate-pyramids, in the quadrangular enclosures surrounding the vimanas; and the *choultries* or pillared halls, used for various purposes. The

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general characteristics of a Dravidian temple of the first class are the storied pyramidal towers, the hall of 1,000 columns, the bold cornice with double flexure, the detached shafts, the richly carved stylobate, and the large tanks with flights of stone steps. The Chalukyan style, so named from a dynasty which rose in the 6th century in what is now Mysore and the Nizam's Territory, reached its perfection in Mysore from the 11th to the 14th century. The characteristic features are the open porch, the straight-lined, conical-shaped tower, the star-shaped temple, and the basement terrace of stone.

The Indian-Saracenic style is a general name for a number of somewhat varying styles, the result of the mixture of Saracenic principles of architecture, brought with them by the Mohammedan conquerors of India, and the distinctive architectural features of the different localities where they settled. Under the Mogul emperors in the 16th century were erected some most magnificent buildings, such as the tomb of Humayun Shah at Old Delhi; that of Akbar at Secundra; the palaces of Shah Jehan at Agra and Delhi; and the Taj Mahal, built by the same monarch at Agra. (See AGRA.) The Moslem architecture of India contrasts with the native Indian styles in its use of the radiating arch, in the superior simplicity and grandeur of its style—its flat ornamentation not interfering with the lines of true architectural construction. A characteristic feature also is its fine conventionalism of vegetable forms for decoration and tracery. See Moslem Architecture under ARCHITECTURE.

Indian Bean, a catalpa (q.v.); specifically the large southern tree (*Catalpa catalpa*), now planted as a shade or ornamental tree all over the country on account of the beauty of its masses of spring flowers and the quaint appearance in autumn of its long, bean-pod-like fruit.

Indian Bible, the first Indian translation of the Bible in the New England colonies. This translation was made in 1663 by John Eliot, "The Apostle to the North American Indians." It was in the dialect of the Naticks, a Massachusetts tribe of the Algonquins. A second revised and corrected edition was printed in 1685, only 12 copies of which are known to exist. An edition with notes by P. S. Du Poneau, and an introduction by J. Pickering, was published in Boston in 1822. When the original edition was issued, 20 copies were ordered to be sent to England. A copy of the edition of 1663, with the Epistle Dedication, was sold in 1882 for \$2,900.

Indian Bread-root, a plant of the genus *Psoralea*; the "large" was *P. esculenta*; the "small" *P. hypogaea*. See BREAD-ROOT.

Indian Corn. See MAIZE.

Indian Fig. See PRICKLY PEAR.

Indian Head, (1) the highest point of the Palisades, 550 feet; so called because it resembles somewhat the head of an Indian. It is in the northeastern part of New Jersey, on the Hudson and opposite Hastings. (2) The name of a village in Fayette County, Pa. (3) A small town in Maryland, on the Potomac River, below Washington, the seat of a naval station.

Indian Hemp. See CANADA HEMP; APOCYANACEAE.

Indian Hippo, an American plant. See BOWMAN'S ROOT.

Indian Humped Cattle, a species of East Indian oxen (*Bos indicus*), now known only in the domesticated state, distinguished by a high fatty hump on the withers, by the prevalent ashy gray color, large drooping ears, enormous dewlap and several structural peculiarities. They vary in size from those as large as a European ox to the smallness of a half-grown calf. They form the working cattle and draft animals all over India and eastward more or less locally to China. They are venerated by the more pious sects of Hindus, especially in the persons of certain privileged bulls, called Brahma or Brahminy bulls, which wander about the bazaars of cities unharmed and uncheked in their depredations upon market produce.

Humped cattle are known in Madagascar, and in Abyssinia, and it has been suggested that the species was originally African. The Abyssinian form is a large animal with huge horns called "galla ox" or sunga. These animals seem to thrive only in hot countries, and have never been found profitable outside of their present range.

Indian Language and Literature. See INDIA.

Indian Mutiny. The British occupation of India had been largely aided by native troops called Sepoys, who were enrolled under British officers in the service of the East India Company. At the close of Lord Dalhousie's sway in 1856, when the whole of India seemed to have been either reduced directly under British rule, or if retaining its native princes to have placed itself under British protection, the Sepoy mutiny, a contingency for which the government ought not to have been altogether unprepared, occurred. Previous symptoms of disaffection had not been wanting. Mutiny had on several occasions broken out in the native army, in a way to indicate how easily through causes which Europeans, from their defective sympathy with native thought and feeling, could not anticipate, these troops might be alienated; but, on the other hand, the general fidelity of the Sepoys merited confidence, and this feeling prevailed over any grounds of suspicion which might have been formed from isolated occurrences. The Sepoys in Bengal were mostly either Mohammedans, or Hindus of the Brahmanical or military castes. The recent annexations had alarmed the native chiefs, while the fanatical Hindus had been deeply offended by reforms, including the successive abolition of various rites of their worship. Two European regiments had been drafted off for the Crimean war, and had not been replaced. Others had been sent to Burma, and in the beginning of 1857 fresh regiments were despatched to Persia, so that only eighteen regiments were left in all Northern India, of which nine were in the Panjab. In Oudh, where, from its recent annexation, disaffection was rife, there was only one British regiment, and Delhi and Allahabad, the two chief arsenals, were guarded by native troops. To add to these favorable cir-

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cumstances a Hindu devotee had prophesied the termination of British rule at 100 years after the battle of Plassey. A slight incident sufficed to give point and direction to a spirit of disaffection which so many circumstances tended to favor. At this time the Enfield rifle was introduced into the Bengal army. This rifle was loaded with a greased cartridge, the end of which required to be bitten off at the time of loading. By a natural inadvertence the authorities had neglected to consider how this seemingly trifling requirement might affect the easily excited sensitiveness of the Hindus in regard to caste, and this insignificant circumstance removed the last security against a united movement of disloyalty among the native troops, by establishing a bond of sympathy between the Mohammedans and Hindus. A report got abroad that the cartridges were to be soaked in cow and pork fat. The prejudices of Hindus and Mohammedans were thus equally involved, and as this rumor rapidly spread, the excited imagination of the Sepoys conceived a conspiracy on the part of the government to convert them forcibly to Christianity, by compelling them to violate the laws of their own religion. When this grievance was explained it was at once removed, the manufacture of greased cartridges at Dum dum was stopped, and the men were instructed to grease them themselves with materials procured at the bazaars. Suspicion once aroused, however, was not to be allayed, and easily found a new object of contention. The paper of the new cartridges was glazed, and it was again alleged that grease was used in its manufacture. The spirit of disaffection became too deep-rooted for any measures of conciliation. Conferences among the disaffected gave rise to ambitious schemes, and the original grievances became a pretext in the hands of unscrupulous leaders, whose excesses debarred them even from the plea of patriotism, to extirpate the British power in India. On 26 February the first overt act of mutiny took place at Berhampur, when a regiment refused to receive their cartridges. Another dangerous outbreak took place at Barrackpur on 29 March. The arrival of a British regiment from Burma and the disbandment of the disaffected regiments was thought to have ended the trouble, but it soon became evident that disaffection, which had only wanted an occasion, was spreading rapidly not only among the Sepoys, but among the Hindus generally. Another outbreak took place on 2 May, near Lucknow, when a regiment of cavalry were, by some oversight of the government's instructions, ordered to bite their cartridges. Sir Henry Lawrence succeeded by a show of force in disarming it. A more formidable outbreak occurred about the same time at Meerut, 35 miles northeast of Delhi, when the mutineers, with the assistance of the native inhabitants, indiscriminately massacred the Europeans and escaped to Delhi. The advance-guard of the mutineers reached Delhi on 11 May, and at once entered the city, where they were assisted by the king's servants in massacring the Europeans. The native troops cantoned outside the city in the meantime joined the main body of the mutineers, and assisted in massacring their European officers. About 50 Europeans sought refuge in the palace, and placed themselves

under the protection of the king, who had placed himself on the throne of the Moguls. These after some days were coolly murdered in an open court in presence of a general concourse of spectators, conspicuous among whom was Mirza Mogul, the king's eldest son, who had assumed the title of commander-in-chief. The magazine at Delhi had been blown up by its defenders; but the explosion was only partial, and most of its contents fell into the hands of the mutineers. European troops were now summoned from all quarters. Several regiments were detached from an expedition which was proceeding under Lord Elgin to China, and the Persian war having been concluded, the troops engaged there were immediately recalled. When intelligence of these events reached the Panjab the mutinous spirit which prevailed among the large body of Hindustani troops there was promptly subdued by disarmament. The Sikhs, though the Panjab had been so recently annexed, continued faithful. But the revolt had spread rapidly elsewhere, and British authority was almost extinct throughout the Bengal Presidency. Everywhere the mutiny was attended with savage excesses—women were outraged, and Europeans, without distinction of age or sex, barbarously murdered. Sir Hugh Wheeler, at Cawnpore, was betrayed by Nana Sahib, maharajah of Bithur, who, after offering aid, took the mutineers into his pay, and raising the Mahratta standard, besieged Cawnpore. The siege, or rather bombardment, lasted from 7-24 June, when a capitulation was agreed to, on a sworn promise of Nana Sahib to allow the garrison to retire to Allahabad. But as the embarkation was proceeding the boats were attacked by the Nana's troops, and the men indiscriminately massacred. The women and children were for the meantime made prisoners. Sir Henry Lawrence was besieged in Lucknow, where he died on 4 July from a wound received in a sortie.

Meanwhile mutineers had been converging on Delhi, and British reinforcements were hastening to the besieging camp on the ridge above the city. After protracted operations and repeated reinforcements on both sides Delhi was taken by assault, 14-20 September. Sir Henry Havelock, who had been engaged in the Persian campaign, had arrived in Calcutta, and immediately set out for Allahabad, to commence operations for the relief of Lucknow and Cawnpore. While his force was victoriously advancing on Cawnpore Nana Sahib, on 15 July barbarously massacred his prisoners, consisting of 210 women and children. Havelock was succeeded in the command at Lucknow by Sir James Outram, who held it till relieved by Sir Colin Campbell, on 17 November. At first it was feared that the mutiny might extend to the Bombay and Madras presidencies, and from this cause and the occupation of the troops in Bengal the mutineers had been left unchecked in Central India. At length columns organized in these presidencies entered Central India, and were united under Sir Hugh Rose. By the operations of these commanders the brave Rani of Jhansi, who died fighting at the head of her troops, was defeated, and Tantia Topi whose military capacity had prolonged Nana Sahib's resistance, was captured and the mutiny was

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finally suppressed. The war was substantially closed by June 1858, although the complete pacification of Oudh was not effected till the end of the year. See INDIA, EAST INDIA COMPANIES. Consult: Malleson, 'History of the Indian Mutiny' (1897).

Indian Ocean, that body of water which has Asia on the north, the East Indian Islands, Nicobar and the Andaman Islands, Australia and Tasmania on the east, Africa on the west, and the Antarctic continent on the south. The Cape of Good Hope, and the southern extremity of Tasmania may be considered its extreme limits from east to west. Its length from north to south somewhat exceeds 6,500 miles, its breadth varies from 6,000 to 4,000 miles. Its gulfs are the Red Sea, the Gulf of Aden, the Persian Gulf, the Gulf of Oman, the Arabian Sea, the Bay of Bengal, and the Great Australian Bight. Its islands are Ceylon, Madagascar, the Laccadives, Maldives, Socotra, Andamans, Nicobar, Mauritius, Bourbon, Kerguelen's Land, etc. Rocks and coral reefs render navigation dangerous. The Ganges, Brahmaputra, Irrawaddy, Indus, Euphrates, Gadaravi, empty into the Indian Ocean. The southeast trade-wind blows between the 10th and 28th parallels of south latitude from April to October, after which date its limits are contracted; south of these are the northwest winds, which prevail almost in the same latitude, in the Atlantic and Pacific. The monsoons are mainly to be found in the north, from the continent of Asia to about lat. 8° S., and from the Mozambique Channel on the west to the western shores of Australia and the sea of China. They blow for six months, changing about the equinoxes. North of the equator the northeast monsoon prevails from October to April, the southwest from April to October; while south of that the northwest monsoon blows while the northeast is blowing on the north side, and the southeast prevails during the time of the southwest monsoon north of the equator. In the hot season, likewise, when the southeast trade-wind recedes south, the northwest monsoon flows between the equator and the 12th south parallel. The hurricanes of this ocean usually range between lat. 9° and 31° S., extending from Madagascar to the Island of Timor. They usually come from the northeast, and travel southwest and south, returning again east. Their season is from December to April.

According to the most recent soundings the mean depth of the Indian Ocean is 2,300 fathoms, or somewhat greater than that of the Atlantic. The greatest depths are in the eastern part to the south of the equator, where it is estimated that there are fully 50,000 square miles with a depth of over 3,000 fathoms. Over 13,000,000 square miles lie between the depths of 2,000 and 3,000 fathoms.

The area of land draining into the Indian Ocean is estimated at 6,813,600 square miles, and the rainfall on this land amounts to 4,379 cubic miles of water annually. The rivers flowing from the Asiatic continent are by far the most important, and they carry a vast amount of detritus into the Bay of Bengal and Arabian Sea, these forming immense deposits of blue mud. Along the African coasts, in depths from

100 to 1,000 fathoms, there are glauconitic sands and muds, and on these as well as other coasts, coral muds and sands, and blue and green muds in the shallower depths. In the deeper parts of the ocean, far from land, there are deposits of red clay, radiolarian-ooze, and globigerina-ooze. Toward the Antarctic continent the ocean bed is covered with a diatom-ooze.

The temperature of the surface waters varies much in different parts of the ocean, at different seasons, and under the influence of different winds. In tropical regions the temperature usually varies from 70° to 80° F., and the yearly range is 7° or 8° F. Off the Cape of Good Hope and Cape Guardafui, the annual range may be from 20° to 30° F. Sudden changes of temperature are often noticed off Cape Guardafui when the wind blows off shore. The cold and deep water is thus drawn up along the coast to take the place of the warm surface water which is driven east by the wind.

The temperature of the water at the bottom is very uniform and subject to little, if any, annual variation. In the Bay of Bengal and Arabian Sea temperatures of 33.7° F. and 34.2° F. have been recorded; these are only very slightly higher than those recorded by the Challenger in lat. 50° S. It is certain, therefore, that this deep cold water is slowly drawn into the Indian Ocean from the Antarctic to supply the place of the warm surface currents that are driven south by the winds.

The currents of the Indian Ocean are less constant than in the other oceans, being largely controlled by the monsoons. Some characteristic coral atolls and islands are found toward the central part, such as the great Maldivian group, the Chagos, Diego Garcia, and the Cocos Islands. The tropical shores are generally skirted by fringing and barrier reefs. Christmas Island is coral formation, while St. Paul's, Mauritius, Rodriguez, and others are of volcanic origin, and Madagascar, Ceylon, and Socotra, continental islands.

The Indian Ocean was little known to the ancients. The first Europeans who explored it seem to have been the Phoenicians, who in the 7th century B.C. held the thalassocracy, or marine domination of the Mediterranean. Necho, an Egyptian monarch who flourished about 610 B.C., is reported by Herodotus to have sent some of his vessels, manned by Phoenicians, into the Indian Ocean, then known as the Erythraean Sea, to circumnavigate Africa. This they did, starting from the Arabian Gulf and regaining Europe by the Columns of Hercules. In the 6th century B.C. this sea was traversed by Hanno, a Phoenician admiral of Carthage. There is still extant his account of the voyage which is translated into Greek under the title 'Hanno's Voyage of Circumnavigation.' The Greek historian Arrian has given us an account of the coasting voyage of Nearchus, one of Alexander's generals, from the Indus to the mouth of the Tigris and Euphrates.

Hippalus, an Egyptian navigator who flourished about the beginning of the Christian era, was the first to observe the regular monsoons of the Indian Ocean, and to profit by them. In the 9th century the Arabs made frequent voyages across the Indian Ocean. In 1486 the Portuguese rounded the Cape of Good Hope,

INDIAN PAINT—INDIAN SUMMER

and in 1498 Vasco da Gama reached the coasts of India by the same route. In 1521 a ship of Magellan's squadron crossed the Indian Ocean in completing the first circumnavigation of the world.

Indian Paint, the name of two American plants: (1) the golden seal (q.v.) or orange-root, which furnishes a yellow color; and (2) the bloodroot. (See *SANGUINARIA*.)

Indian Paint-brush. See *PAINTED CUP*.

Indian Physic, an American plant. See *BOWMAN'S ROOT*.

Indian Pipe, or **Corpse-plant**, a smooth, waxy-looking, fleshy herb (*Monotropa uniflora*), of the order *Ericaceæ*, widely distributed in dark, rich woods almost throughout North America. It is said to derive some of its food from the roots of other plants, but much is obtained from decaying vegetable matter. From a matted mass of fibrous rootlets the white scaly, but not leafy, stems rise to a height of perhaps eight inches, and bear solitary, nodding, white, inodorous flowers during summer, followed by erect many-seeded fruits.

Indian Races. The numerous peoples of India belong to several distinct groups or families, speaking numerous dialects founded on two or three distinct stocks which are much blended by the intercourse of the different peoples with each other. Previous to the Mohammedan ascendancy the dominant race were the Hindus, whose language is spread in various dialects over a great part of India, but who were not the aboriginal inhabitants nor even the first invaders. From the northwest of India, through Kashmir and down the valley of the Indus, and from Tibet through the passes of the Himalayas, the inhabitants of northern Asia have from a very early period migrated southward to the milder and more fertile plains of India. Two great successions of these invasions are recognized as having taken place before the period of authentic history. The first immigrants, of dubious ethnological connections, but commonly known as the Tamil races, appear to have overspread the entire peninsula. Following them the Sanskrit-speaking peoples, called the Hindus, of Aryan speech, dispossessed the Tamil races, and superseded their language in the whole of India north of the Narbada. The Hindus subsequently descended into the peninsula and penetrated as far as Cape Comorin; but though their influence on the languages of Southern India was considerable in the way of introducing new terms, the grammar and construction of the Tamil languages maintained their place in the districts south of the Narbada. Two great groups of languages were thus spread over India, which were further modified by the Mohammedan invasion. The native tribes were not exterminated by these invasions, but are still to be found under various names, as Bhils, Catties, Coolies, Gonds, etc., inhabiting the fastnesses of the mountain ranges in Bengal, the Vindhya and Satpura Mountains, the Ghâts, etc. The hill tribes and other aborigines in all India are estimated at 70,000,000. The leading religion is Brahmanism, the professed creed of the majority of the Hindus and the religion most distinctive of India. It reckoned 207,000,000 adherents in 1901. Large numbers in the north and northwest are Mohammedans (about 62,-

500,000). Buddhists number about 9,500,000; Parsees or Fire-worshippers 95,000; Sikhs 2,200,000. Among the Hindus the caste system still prevails. European missionaries have long been active, but only a mere fraction of the people are as yet Christians (2,284,380). Education is now making good progress, schools and colleges of all kinds having been established throughout the country. The pupils, however, only number about 4,000,000 in all. There are universities at Calcutta, Bombay, and Madras, besides other two at Lahore and Allahabad.

Indian Red, an impure oxide of iron, used as a pigment by painters. It was originally imported from India, but is now chiefly prepared by roasting ferrous sulphate. The sulphuric acid is expelled by the heat, and the red oxid of iron remains behind. It is very permanent, and the color varies from purplish to a yellowish red.

Indian River, an important stream in the eastern part of Florida, in Brevard and Volusia counties. It connects with the Halifax River at Titusville and extends 100 miles southeast to the ocean at Indian Inlet. Its width varies from 300 feet to 3 miles and it is navigable for vessels drawing five feet. The Indian River is famous for the excellent oranges grown along its banks.

Indian Schools, in the United States, are schools specially established either by private or denominational means or by the national government, for the education of children and youth of the Indian population of this country. For particulars concerning these schools see *INDIAN AFFAIRS; INDIAN EDUCATION OF THE*.

Indian Shot. See *CANNA*.

Indian Summer, the name given to a period of mild summer weather which generally occurs toward the end of autumn. The term first made its appearance in the last decade of the 18th century. During the next decade the phrase was "second summer." This indicates that the spell of weather known by this name was not generally noticed much before 1800. The term Indian summer became established about 20 years after its first appearance, which was in western Pennsylvania, and spread to New England by 1798, to New York by 1799, to Canada by 1821, and to England by 1830. The term is, then, not an Americanism; to write in praise of Indian summer is now a literary convention of three continents.

It is by no means easy to account for the origin of the term. The principal characteristics of the season which it describes are haziness, smokiness, and high temperature. Some explanations of the origin of the term are (1) that the Indians predicted such spells of weather; (2) that the smokiness was produced by Indian fires; (3) that this was the last season of Indian attacks on the settlements of the whites; (4) that the season partook of the Indian character of deceptiveness; (5) that the name was given because one of the seasons of East India was similar in character. Horace Walpole used the term in 1778, not in reference to America, but in relation to weather in the tropics. "Squaw winter" was a name for the spell of cold weather preceding the Indian summer, and perhaps the key to the nomenclature is to be sought in this latter term.

INDIAN TERRITORY

Indian Territory, an organized body of land in the southwest centre of the United States, occupied by Indian allotments and reservations; not a "Territory" in the official sense, as it has no common local government, head, or capital, and sends no delegates to Congress. It lies between Kansas north and Texas south, Arkansas and a corner of Missouri east, and Oklahoma (till recently its own western half) west. It is about 250 miles north to south, and from 75 to 200 east and west. Area, 31,400 square miles, of which 400 are water.

The topography of the district is not yet fully studied, as Indians do not make surveys, and till less than a decade ago the government had no motive but a scientific one for undertaking them. Hence the interior was nearly as little known as central Africa, and as much misunderstood. Even yet, nearly every reference book describes the entire surface as "flat" or "gently rolling," and mostly prairie. But the government survey authorized in 1894, when the reduction to civilized conditions was undertaken, found it to be one fourth mountainous plateau, and two thirds woodland well distributed, mainly through the east and southwest portions. The prairie section is a continuation of the Kansas plains, and occupies most of the Cherokee district north of the Arkansas, and the Creek triangle between the Arkansas and Canadian, with about a fourth of the western half below the Canadian, the rest being timber land. In the extreme northeast is a rugged plateau cut by streams with a southward trend, west of which is a rolling plain with some hills. South of this the Ozark mountain chain, entering from Arkansas, stretches from northeast to southwest across the Territory, with a gradual declension; from about 2,500 feet high near the Arkansas line, they sink to about 1,000 feet in the centre. Their more pronounced elevations are termed the Boston, Poteau, Kiamichi, Sans Bois (treeless), Shawnee, etc. In the Chickasaw territory at the southwest, a set of low elevations from Tishomingo northwest, rising in the sharp spur called the Arbuckle Mountains, and again farther on in the Wichita Mountains of Oklahoma, connect the Ozarks with the outliers of the Rockies. The highest elevation in the Territory is about 3,000 feet above sea-level, the lowest 350. The timber north of the Canadian is mainly confined to a belt in the west, save for cottonwoods, elms, pecans, and a few other sorts along the streams; south of it the timber occupies much the greater portion, even in the west. The eastern half of the Territory is nearly all well wooded, the mountainous parts most heavily so; the woods besides the above are oak, largely in a belt from the Arkansas to the Red called the Cross Timbers (used only for fuel and railroad ties, not for construction), with valuable yellow pine and red cedar on the elevated grounds, and walnut in the bottoms.

The drainage belongs entirely to the Arkansas and Red River systems. The former, flowing across and cutting off a northern cantle, is joined east of the centre at Webber's Falls by the long Canadian, its main affluent, which forms nearly the median line of the Territory and its northern boundary with Oklahoma; and is further fed from the north by the Neosho and the Verdigris joining close together, and by the Illinois near the Canadian. The latter

has hardly any water-shed on the south. Nearly the whole southern half of the Territory is drained by the affluents of the Red, forming the entire boundary with Texas; the chief are the Washita in the southwest and the Kiamichi in the southeast.

Geology and Minerals.—Geologically, the Territory may be divided into four sections: (1) The Arbuckle-Wichita region, with an outlying granite field at Tishomingo. This contains coal measures on the north and asphalt on the south; the former is the chief mineral product of the Territory. For the year ending 30 June 1903, there were employed in coal mining 6,001 men and boys; there were in operation for the same year 280 coke ovens, producing 52,625 tons of coke; the coal tonnage for the same year was 3,243,692 tons. Large bituminous asphalt deposits occur in the Choctaw and Chickasaw Nations; these have been worked some, but owing to the want of railroad facilities, and the asphalt trust, the operators have not been encouraged with very great success. There are also sandstone and limestone as well as granite. (2) The Ozark system, Carboniferous and Silurian, containing zinc and lead. (3) The northern prairie, Carboniferous, with coal and large quantities of petroleum. (4) The southern plains cropping over from Texas, underlaid by the Cretaceous, with artesian strata, and sand and marl above. There are valuable gold and silver deposits from which Indians have long made all their trinkets, but they have kept the places secret, to prevent an influx of miners.

Fauna.—The characteristic species are the timber and prairie wolves, panthers and foxes, black bear, deer, prairie dogs, and some smaller game. The wild turkey is the most important bird.

Climate and Rainfall.—The Territory belongs to the southern division by temperature and to the middle one by precipitation. It has a mean winter temperature of 35° to 48°, and a summer one of 77° to 82°; while the rainfall, light in the north like western Kansas, is heavy in the southeast (52 inches), and steadily decreases to the west (about 35 inches at Fort Gibson and 30 in the southwest). But hardly anywhere is it too scant for favorable agricultural conditions.

Agriculture.—Scarcely any region of the United States has greater natural advantages in fertile soil and plentiful water supply. With the opening of the Territory to white settlement and ownership, a vast increase in production will be effected. Until within the present year (1904) the word "ownership," as applied to tenures in the Indian Territory, had a peculiar meaning. To protect Indian interests, white men (except licensed traders and those made citizens by marriage to Indian wives in accordance with the laws of the tribe, or adopted into the tribe by tribal legislature) could not hold land, except as tenants of Indian landlords. The fee to the land in all cases was in the Indian tribes, and even the Indian citizen had only in a sense an occupancy right, owning the improvements absolutely, and cultivating the land practically as a fee simple owner, but always subject to future allotment among all the members of the tribe.

Within the past few years, agreements have been made between the United States and each of the five civilized tribes by which the lands of such tribes are being allotted in severalty to

INDIAN TERRITORY

the citizens thereof, with the power of alienation in most of the nations, under certain restrictions, of all, except a certain amount reserved as a homestead, which, in some cases, is inalienable during the life of the allottee, and in others for 21 years, if the allottee lives so long.

In the Creek Nation, 120 acres of an allotment can at present be alienated with the consent of the secretary of the interior, which is being rapidly accomplished, under the rules and regulations prescribed by him, and the allotments are being bought by whites, who are either occupying them themselves or leasing them to other whites. The real Indian, as a rule, is not much of a farmer, and, as the amount granted to an Indian family is generally greater than the head can utilize or cares to utilize, the remainder is leased to some white farmer or cattleman. The whites farm a large proportion of the farms at present. In the year 1890, of the 35,451 farms cultivated by whites only 3,475 were owned by them.

These allotments to the Indians vary in the different tribes. A Choctaw and Chickasaw allotment is 320 acres of average allotable land, and of this the homestead consists of 160 acres of average allotable land, the latter inalienable during the lifetime of the allottee, not exceeding 21 years from the date of the certificate of allotment; the remainder of the land is alienable after issuance of patent, as follows: one fourth in acreage in one year, one fourth in acreage in three years, and the balance in five years; in each case from date of patent.

The Creek allotment is 160 acres, 120 of which is inalienable before the expiration of five years from the 8th day of August 1903, except with the approval of the secretary of the interior; the balance of 40 acres constitutes a homestead, which is inalienable for 21 years, unless the allottee sooner die, in which event the homestead remains for the use and benefit of children born too late to receive an allotment; but, if there be no such issue, then the allottee may dispose of his homestead by will free from restrictions, and, if this be not done, it descends to his heirs free from any limitations.

In all the above cases, as well as in the Seminole Nation, where the land was divided equally between all the members of the tribe, the allottee had the right to select his allotment so as to include any improvements owned by him at the time. At present the allottees can rent their allotments for one year for grazing purposes, and five years for agricultural purposes, and longer in some cases with the consent of the secretary of the interior. Mineral leases may also be made up to 15 years with the consent of the secretary of the interior.

The productions might easily be of the greatest variety in this warm moist region, but the conditions of tenure hitherto did not encourage tenants to diversify crops or improve the condition of farms to revert to Indian owners. The great crop at present is corn, of which in 1900, 30,709,470 bushels were raised; 1,486,820 of wheat, and 1,102,200 of oats were reported. The territory is well within the cotton belt, and 154,850 bales were shipped in 1900. The other products of note were about \$1,000,000 of vegetables and fruits. Stock-raising is largely carried on; the value of domestic animals in 1900 exceeded \$40,000,000, and included 110,687 dairy cows, 275,000 horses, mules and asses, 17,000

sheep, 10,500 goats and 650,000 swine. It has been known to many that there was a large quantity of oil and gas in this country, but owing to the lack of laws permitting leases and development in the Indian lands, nothing was done until within the last 18 months. The change in the laws, however, has permitted a great deal of development work in some of the towns as well as on outside allotments, and the production is proving very satisfactory to the lessees, as well as the lessors. The field thus far developed is in the northern portion of the Cherokee Nation and the border of the Creek Nation.

Manufacturing.—The manufactures till recently have been mostly confined to the Indian hand-made blankets, shawls, baskets, and trinkets. But within the decade a considerable genuine manufacture by whites has arisen. With only 20 establishments in 1890, there were 789 in 1900; the capital had grown from \$204,329 to \$2,624,265, the wage-earners from 167 to 1,714, the value of products from \$248,932 to \$3,892,181. The one great industry, nearly a third of the total products, was flour and grist milling; next greatest, toward half a million each, were cotton-seed oil and cake; and lumber, saddlery and harness, and car-shop work were also noted.

Railroads.—There are about 1,800 miles of railroad in the Territory: Several great lines cross it, giving the facilities for the vast business growth. The main lines are the Frisco System (St. L. and San F.), the St. Louis, Iron Mountain & Southern, the Missouri, Kansas & Texas, the Choctaw, Oklahoma & Gulf, the Atchison, Topeka & Santa Fe, and the Ft. Smith & Western.

Banks.—In 1902 there were 69 national banks, with capital of \$2,779,000, deposits of \$5,896,000, cash and other resources \$548,000, and loans and discounts of \$7,277,000. There were also 20 private banks, having capital of \$203,975, deposits of \$495,810, cash of \$56,354 and loans and discounts of \$602,676.

Population.—The total population in 1890 was 180,882; in 1900, 392,060, the increase being all white. The real Indian population had probably somewhat decreased, though it showed on the face a slight increase, from 51,279 to 52,500. But the word "Indian" is misleading: for legal purposes and tribal recognition, any one is an Indian who has even 1-64 or in fact any degree of Indian blood in him; and probably two thirds of the so-called Indians are mixtures of various complexities and elements. The negroes, numbering 36,853, are for the most part the former slaves of the Indians, to whom the United States after the war forced the tribes to grant citizenship and a share of the tribal lands and bounties, or their descendants. These two and the vast white population—married and adopted, leaseholders and tenant farmers, hired farm laborers, business men with permits, coal and railroad company employees, etc.—were distributed among the chief districts as follows (besides 27 Chinese):

Chickasaw Nation, 124,306 whites, 9,066 negroes, 5,872 "Indians." Cherokee Nation, 66,951 whites, 9,162 negroes, 25,639 Indians. Choctaw Nation, 79,332 whites, 10,123 negroes, 10,321 Indians. Seminole Nation, 1,143 whites, 981 negroes, 1,662 Indians. The other reservations—Modoc, Ottawa, Peoria, Quapaw, Seneca, Shawnee, Wyandotte—had 5,762 whites and

INDIAN TOBACCO — INDIAN TURNIP

1,043 Indians. The concentration of whites in the Chickasaw district had made it the industrial leader of the territory.

The towns which grew there formerly had a peculiar status. They were "white" towns with white men occupying the buildings they had erected, and doing business insecurely, without legal title, but the ostensible owners of the ground were the Indians. The so-called Curtis Bill and the various agreements made with the tribes above referred to have changed this condition, and made it possible for the white man, or any other occupants of towns in the Indian Territory to purchase lots under the various provisions of these bills upon which they owned houses or other valuable improvements. The result is that all the larger towns have been platted, surveyed and sold to the occupants, so that the Indian titles have become almost entirely extinguished. Within a year or eighteen months every town within the limits of the Indian Territory will have been so platted and sold. The changes are so great and constant that statistics are nearly as useless as in a new mining district, but it may be said that the present chief towns are Ardmore, and Chickasha, in the Chickasaw Nation, South McAlister in Choctaw Nation, and Muskogee in the Creek Nation, is the handsomest town in the Territory, with good public schools, churches and four colleges of the four leading denominations — Baptist, Methodist, Presbyterian, and Roman Catholic. These towns now have a population approaching 10,000 each and there are over 20 others with over 1,000. The oldest white settlement is Vinita in Cherokee; the oldest in the southeast is Caddo; the best known has always been Tahlequah, for some generations the capital of the Cherokee Nation.

Internal Conditions and History.—The Territory was part of the Louisiana Purchase. Early in the 19th century many of the Southern Indians, their old hunting grounds invaded by the whites, removed to this virgin forest. In 1832 it was fixed on by the national government as a place for the tribes whom agreements with the Southern States had bound us to deport, and in 1834 special reservations were set apart. The Five Civilized Tribes, as they are called, established governments on the civilized model, with elected legislature, council and governor, courts and schools and responsible financial management, and even newspapers in the Cherokee tongue, with Sequoyah's famous alphabet. But the vast enclave of nearly 70,000 square miles in the heart of a swelling settlement could not be maintained, and the Indians from some constitutional blight do not grow to fill their districts. In 1866 some 5,500,000 acres were purchased of the Indians in the present Oklahoma; on 22 April 1889 over 3,000,000 acres were thrown open to settlement; on 2 May 1890 this and other territory was formed into Oklahoma. Meantime the old system in the eastern part was going to wreck, not so much from the white immigration, following the railroads which began to cross it, as from internal development which was making the primal object of the system a mockery. It was designed to protect the half-helpless Indian from white greed till he could stand on his own feet; in fact, the half-breeds and the intermarried whites were rapidly appropriating everything to themselves, while the full-blood was "crowded out upon the moun-

tain and unproductive land, to take care of himself as best he could." (Dawes Commission.) The tribal governments were under control of these governments and were "recklessly leasing the community lands to cattlemen and coal companies" (Hinton), to railroads, oil and lumber companies, etc. The government, therefore, under the lead of ex-Senator Henry L. Dawes of Massachusetts, set about negotiations to break up the tribal governments, and turn the Territory into a set of ordinary civilized communities with ownership in severalty, protecting the Indian for a time by restraining his liberty of alienation. The Dawes Commission of 1893 began this work; in 1897 the United States extended its judicial power over the district; in 1898 the Curtis Act carried out the work, providing for the enrollment of citizens for allotment of lands, for laying out town sites and incorporating towns with power to elect officers and tax themselves for schools, etc., and giving the President a veto power over the tribal legislatures. The arrangements vary with the different tribes; the Seminoles continue their government after a fashion for the present, the Choctaws and Chickasaws with some modifications till 4 March 1906. The present government consists in reality of four federal judges or one court of appeals and four district courts, with 20 commissioners acting as petty courts and justices of the peace, and a resident Indian Inspector. The statutory code is in the main that of Arkansas.

The educational situation has been a part of the anomalous position of all social matters. The tribes maintained schools and admitted white children on payment of a fee; and the missionaries have operated others. But all were very insufficient, and the tribal schools, once the best of the vicinity, have not kept their quality. The Curtis Act of 1898 for the first time provided a public-school system, in cities and towns, and power of towns to levy taxes for them. In 1900 it was estimated that 50,000 white children were deprived of school advantages. Of academic schools, some claiming collegiate rank, there are good ones in each nation; these have sent many pupils to Eastern colleges. By act of 19 May 1902 municipalities of 2,000 or more inhabitants may issue bonds up to 10 per cent of their assessed valuation for school buildings, sewers, and waterworks on a two-thirds vote and with a 20-year sinking fund. Pop (1900) 392,062; (1903) fully 500,000. Consult: "Report of the Dawes Commission" (1903); Curtis Act in U. S. Statutes. WILLIAM T HUTCHINGS,
Muskogee, Indian Territory.

Indian or Wild Tobacco, one of the North American lobelias (*Lobelia inflata*), also called asthma-weed and gag-plant,—a tall plant with small light blue flowers quite overshadowed by numerous thin, oval, or obovate dentate leaves; the plant branches as a panicle, is pubescent and the pod is inflated. Its leaves have an acrid taste, and are, as Gray says, "poisonous and a quack medicine"; they were dried by the Indians as a substitute for smoking tobacco, or to mix with it, for the sake of their narcotic properties. The dried flowers still have a place in *materia medica*. It grows in dry fields and thickets through North America. Compare KINNICKINICK.

Indian Turnip. See JACK-IN-THE-PULPIT.

INDIAN YELLOW—INDIANA

Indian Yellow, known in commerce as **PUREE**, a pigment of unknown origin which is exported from India, China and probably from Arabia. It comes in the shape of balls, which are outside of a brown tint, and inside of a brilliant yellow. It has the odor of urine, musk or castoreum, is soluble in water or alcohol, and an essential element in its composition is carbonate of euranthin. It is used in India for house decoration, and is valued by artists all over the world as a dazzling pigment.

Indiana ("The Hoosier State"), a north-central State of the United States (No. 19 in order of admission) bounded north by Michigan, south by Kentucky, east by Ohio, west by Illinois; extreme length 276 miles, extreme breadth 177 miles; area (No. 34 in U. S.) 36,350 square miles, 440 water; pop. 1900 (No. 8 in U. S.) 2,516,402, or 70.1 to the square mile. (No. 11 in density.) The State boundary in Lake Michigan is an east and west line 10 miles north of the extreme southern point of the Lake. The Ohio River runs along the southern boundary, but, by a provision of the Virginia cession of Northwest Territory, Indiana extends only to low-water mark on the north bank of the Ohio. In consequence all islands in the Ohio belong to Kentucky, the Supreme Court having recently held this as to Green River Island (*Indiana v. Kentucky*, 136 U. S.) which, although an island at the time of the cession, became connected with the Indiana shore by alluvial deposits, and had been governed and taxed as part of Indiana for many years.

Topography.—The surface of the State is comparatively level, the highest point, in Randolph County, in the centre of the eastern tier of counties, being estimated at 1,285 feet above sea-level, and the lowest, at the southwest corner of the State, being 313 feet above sea-level. The Ohio at the southeast corner of the State is 436 feet above sea-level, and Lake Michigan at the northwest corner is 585 feet above sea-level. From the table-land of the east central part of the State, and western Ohio, radiate low water-sheds separating the drainage basins of Indiana. The northern part of the State is quite flat, the central part slightly rolling, and the southern part rather hilly on account of the valleys cut out by water. There are no mountains, and no large lakes, but there are hundreds of small lakes, chiefly in the northern part of the State.

River Systems.—The southern parts of the State are drained to the Ohio River by the Whitewater and smaller tributaries. The central part of the State—about four fifths of its area—is drained by the Wabash and its tributaries, the most important of which are the White, Tippecanoe, Eel, Salamonie and Mississinewa rivers, and Wild Cat Creek. The northeastern corner of the State is drained by the St. Joseph's and St. Mary's rivers; these unite at Ft. Wayne to form the Maumee, which flows into Lake Erie. The extreme northern part of the State is drained by another St. Joseph's, the Calumet, and smaller streams, into Lake Michigan. A part of the northwestern section is drained by the Kankakee and its tributaries to the Illinois River. The Wabash is navigated to a limited extent, by small boats, as high as Terre Haute, and also the lower part of White

River. The remaining streams are not navigable.

Climate.—The climate of Indiana is mild, ranging from an average of 31° F. in the winter months to an average of 76° in summer. The mean temperature is 53°. The average annual rainfall is 43 inches, that in the southern part of the State being slightly in excess of that in the northern part. Serious droughts and destructive storms are rare. In earlier years parts of the State were malarial, but with the clearing of the forests and the drainage of lands this condition has almost wholly disappeared.

Geology.—The earliest geological formation that outcrops in Indiana is the Hudson and Trenton limestone, of the Silurian Age, which appears in the southeastern corner of the State, throughout the Whitewater Valley and the adjacent region. West of this is a belt of Niagara limestone, which broadens at the north and extends entirely across the State, covering all of a dozen counties and large parts of as many more. On the west of this, and also extending to the State line on the north, are belts of Hamilton limestone and sandstone of the Devonian Age. The remainder of the State—the southwestern corner and a broad belt to the north reaching beyond the Wabash—is of the subcarboniferous and carboniferous formations. The northern and central parts of the State are covered by glacial drift, which in some regions is of a depth of 400 feet.

Soils, Agriculture and Forests.—The soil of the State varies in character, but for the most part is fertile. Originally the southern part of the State, and as far north as the Wabash, was covered with a very heavy growth of forest, mostly of hardwood trees. North of this were low prairies interspersed with sand ridges and dotted with hundreds of small lakes. This region is now found very productive of cucumbers, melons and small fruits in the sandy parts. The richest lands are the alluvial valleys of the streams and the drained prairies. The forests have so far disappeared that the State is now encouraging tree planting. Agriculture is the chief industry of the State, the value of farm products in 1899 being reported at \$204,450,196. The chief agricultural products were corn, 178,067,070 bushels, wheat 34,986,280 bushels, oats 34,565,070 bushels, potatoes 6,209,080 bushels, hay 3,470,378 tons. The value of animal products was \$81,947,922, of forest products \$5,235,459, of orchard products \$3,166,338, of dairy products \$15,739,594. The value of the poultry raised in 1899 was \$8,172,993, and of the eggs produced \$7,441,944.

Minerals and Mining Industries.—About one fifth of the surface of Indiana is underlaid by coal, workable veins having been found in 19 counties. There are at least 7 distinct veins of workable thickness, varying from 3 to 11 feet. The coals of the State are of two classes—caking or bituminous, and non-caking or block coal. The latter can be burned in blast furnaces without coking. The production in 1901 was 7,019,203 tons, valued at \$7,370,163, the State ranking sixth in the Union as to quantity and seventh as to value of the product. The number of people employed in coal mining was 12,968. The mineral product second in value was petroleum, the production of which is a

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comparatively new industry. In 1901 the oil product of the State was 5,749,975 barrels, valued at \$4,795,312. This was largely increased—over one third—in 1902. Next in value of the mineral products of the State is building-stone, of which the chief varieties are the oolitic limestone, the blue Devonian limestone, the gray Niagara limestone, and sandstone. The oolitic, so called because composed of minute fossil shells resembling a mass of fish eggs, has become celebrated throughout the United States on account of its superior qualities. In 1901 Indiana was first in rank in the Union in the production of limestone for building purposes, and fifth in rank as to building-stone of all kinds, the product being valued at \$3,028,145. There is also a large production of cement and lime. Good clay is abundant throughout the State, and brick and tile making are extensive industries. Kaolin and glass sand are also found in quantity in several counties, and are profitably mined. Natural gas has been found, by sinking wells, throughout a large part of the State. The supply at one time reached a daily flow of 900,000,000 cubic feet. It served to draw many manufactories to the State, but the pressure is now decreasing. In many places its cessation has been followed by a flow of petroleum. Many other minerals have been found in Indiana, but not in quantities of commercial importance.

Manufactories.—The manufactures of Indiana are chiefly a development of the past 30 years. In the earlier period manufacturing was confined almost wholly to supplies for domestic consumption, and was chiefly conducted at the homes of the people. In 1900 there were reported 18,015 manufacturing establishments in the State, employing 155,956 wage-earners, and producing goods to the value of \$378,120,140. The leading classes of manufactures, with the value of products in 1900 and in 1890, are as follows:

	1900	1890
Slaughtering and meat packing	\$43,862,273	\$27,913,840
Flour and grist mills.....	30,150,766	31,239,627
Distilleries	22,738,106	9,677,973
Lumber and wood manufacturers	34,471,902	32,725,647
Iron and steel (including foundries).....	36,566,527	14,285,259
Glass and glassware.....	14,757,883	2,995,409
Carriages and wagons, and materials	15,801,826	10,531,683
Railroad cars.....	19,248,999	14,362,711
Agricultural implements.....	6,415,081	5,756,131
Textiles and clothing.....	8,618,360	7,736,890
Clay products.....	4,222,529	3,142,454

It is probable that this rate of increase will not be continued in the next decade, partly because of the decrease of natural gas, partly because of abandonment of plants under trust control, and partly for other reasons. The production of lumber in the State was almost stationary in the past decade, and will probably decrease in this on account of decreasing forest supplies.

Commerce and Navigation.—About one tenth of the people of Indiana (in occupations) are engaged in commerce and transportation. The navigation of the State is limited, being confined to the Ohio River on the south, with the

lower Wabash and a small part of the White River, and Lake Michigan on the northwest. The canals of the State are practically abandoned except for water-power. The railroads furnish the chief means of transportation. Commerce is chiefly domestic, but both exportation and importation are steadily increasing.

Fisheries.—Indiana has no fisheries of commercial importance, though it has waters that might be made valuable. Recently laws have been passed for the protection of fish, and some interest is being shown in their propagation.

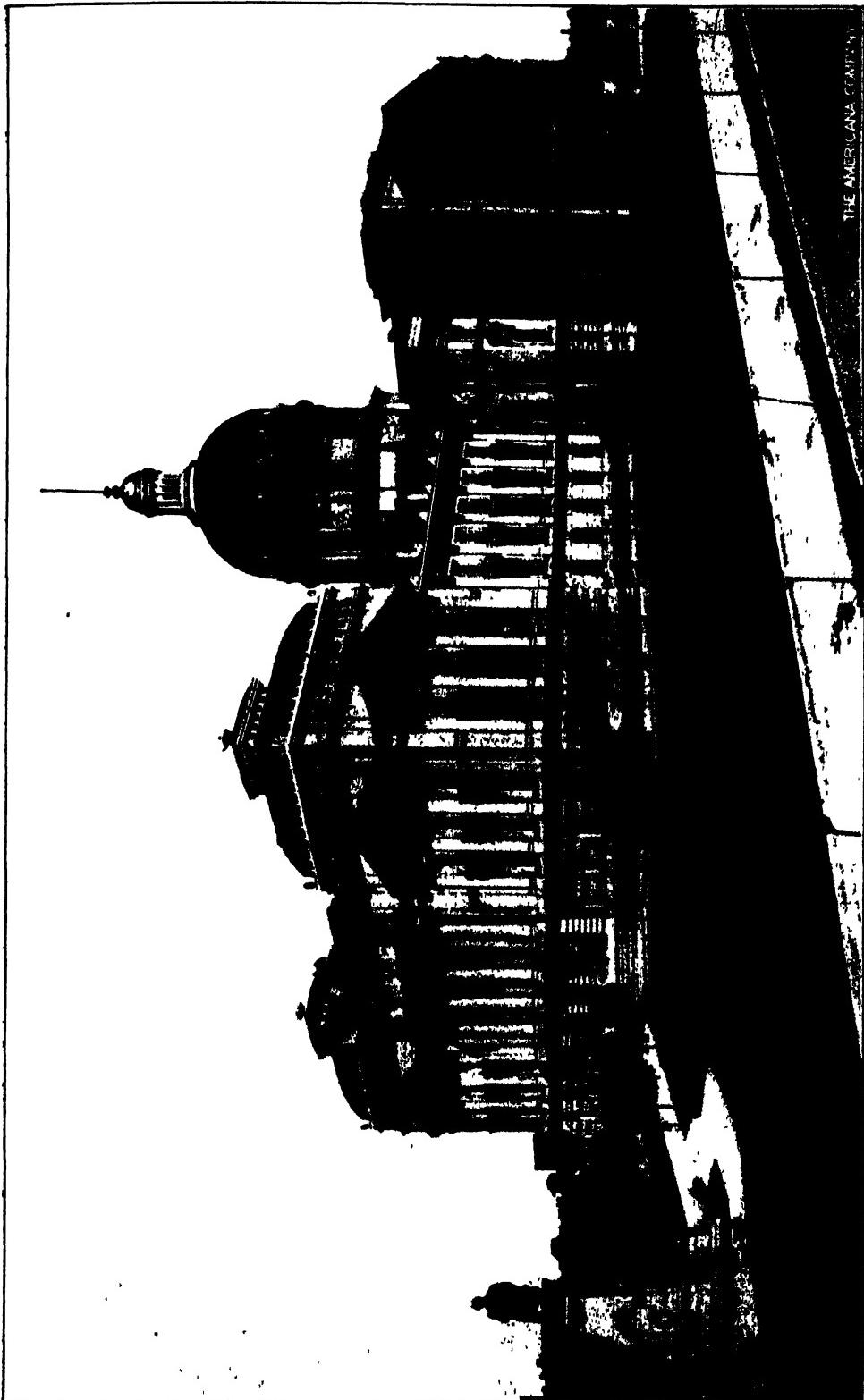
Railroads and Street Railways.—The railroad mileage of Indiana, in 1902, was 6,651 miles, exclusive of second main and side tracks. In 1850 it was 228 miles; in 1880, 4,320. Railroad lines extend through all but 3 counties in the State. The chief railroad centre is Indianapolis, from which 14 lines radiate. These are connected outside of the city by a belt railway. The valuation of railroad property for taxation in 1902 was \$162,797,978. There are street railways in all of the cities and larger towns, the total aggregating 168 miles. In 1899 there began an extraordinary development of electric interurban lines. By the close of 1902 about 400 miles of these were in operation, and 500 miles were under construction, while new lines aggregating over 1,000 miles were projected. These lines have made a material change in the transportation of both passengers and freight, and will apparently furnish large competition with the steam railroads. One of these lines, operating between Indianapolis and Columbus, Ohio, has added sleeping-cars to its equipment.

State Finances.—The assessed valuation of the State in 1901 was \$1,397,981,497, from which deductions for mortgage exemption were made amounting to \$35,160,250. Individuals are permitted to deduct *bona fide* mortgage indebtedness from their schedules to the amount of \$700. The total number of polls was 436,522. The State tax levy for general State government was 9 cents on \$100, and 50 cents poll; for the benevolent institutions 5 cents; for sinking fund 3 cents; for State tuition—which is distributed to the school districts for support of the common schools—11 cents and 50 cents poll; for State institutions of higher education 1½ cents; making a total State levy of 29½ cents and \$1 poll. The reduction of the State debt was begun in 1889, when it amounted to over \$10,000,000. On 31 Oct. 1902, it had been reduced to \$2,887,615.12, on which the annual interest charge was \$101,505.

Banks.—In 1902 there were 137 national banks with \$16,618,552 capital, \$4,789,956 surplus, \$71,533,942 deposits, and \$7,210,780 outstanding circulation; 113 State banks with \$4,884,490 capital, \$915,413 surplus, and \$24,240,334 deposits; 5 savings banks, with \$7,812,157 of deposits; 37 trust companies transacting bank business, with \$4,392,500 capital, \$465,947 surplus, and \$12,378,348 of deposits, and 203 private banks, which are not required to make returns by the State. Of these last named, however, 68 made returns to the comptroller of the currency, showing \$9,671,733 deposits. The only clearing-house organization in the State is at Indianapolis, and the volume of clearings in 1902 was \$270,409,456.

Education.—Indiana has always given much attention to education and especially since the

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adoption of the present school law in 1852. At that time there was created a public school fund, the interest on which was to be distributed to the various school districts. The principal factor in this was the profits which the State had derived from the State Bank of Indiana, amounting to about \$3,500,000, to which was added \$573,000 of the surplus revenue distributed by Congress in 1836, and several smaller funds. To this additions have been made by fines and other public receipts, until in 1902 the common school fund amounted to \$7,978,580.68, to which is to be added the Congressional township fund, derived from the sale of school lands donated by the national government, amounting to \$2,465,304.64. This total fund of \$10,443,885.32 is held by the several counties, and the interest on it is applied to the support of the public schools. Added to this is a State tax of 11 cents on each \$100, and 50 cents on each poll, the proceeds of State liquor licenses and dog licenses, and local taxes assessed by local authorities. From all these sources the actual revenues raised for the public schools in 1902 amounted to \$8,585,354.98. The enumeration of children of school age—6 to 21 years—was 761,801 (of whom 15,002 were colored). A large number of these attended private schools, and the attendance in the public schools for the year was 423,078. The revenue was therefore in excess of \$20 to each child in attendance. There were employed 16,039 teachers, and the average number of days of school was, in townships 126, in towns 153, in cities 179, in the State at large 146. The number of public schoolhouses is 5,080 brick, 4,807 frame, 97 stone, and 3 log. The value of schoolhouses and grounds is \$22,904,607 and of school apparatus \$1,277,455. In these figures are included 704 high schools, which are a part of the public school system. There are also a large number of private schools, notably those maintained by the Roman Catholics and Lutherans for children of all ages, and a number of academies, seminaries, institutes, boarding-schools, military institutions, colleges, normal schools, etc., for intermediate education.

There are three institutions of higher education that receive aid from the State, Indiana University at Bloomington, the State Normal School at Terre Haute, and Purdue University at Lafayette. Indiana University has an income of about \$125,000 derived from a State tax levy and the interest on an endowment fund of \$600,000 raised by State taxation. It had 1,285 students in 1902. The State Normal is also supported by a State levy, and the city of Terre Haute pays one half the expense of keeping the buildings in repair. It has 1,406 students. Purdue has an income of \$150,000 derived from State tax levy and interest on endowments, and including \$57,000 paid to it annually by the United States government as an agricultural school. It has 1,180 students.

Among the private institutions for higher education the more important are Wabash College (Presbyterian), University of Notre Dame and St. Meinrad's College (Roman Catholic), DePauw University (Methodist), Earlham College (Society of Friends), Franklin College (Baptist), Hanover College (Presbyterian), Northern Indiana Normal (non-sectarian), Winona Technical Institute (non-sectarian), and the University of Indianapolis. The last

named was formed by the union of Butler College (Christian) with the Medical College of Indiana, the Indiana Dental College, and the Indiana Law School, all of which are located at Indianapolis.

An important branch of educational work in Indiana is the development of libraries. A feature of the school system adopted in 1852 was the establishment of a free public library in each township in the State. The State expended \$273,000 for books, and the system was received with great public favor, but no provision was made for maintaining or increasing the libraries, and in the pressure of the war times they were allowed very generally to fall into ruin. To some extent these have been replaced as school adjuncts by the libraries of the Young People's Reading Circle, which are found at many of the schoolhouses of the State. These libraries in 1902 contained 436,151 volumes. There has also been a notable development of town and city libraries, 28 towns having accepted donations from Andrew Carnegie, aggregating \$660,000, agreeing to maintain libraries in the buildings thus provided. There are 25 others that are maintaining libraries in buildings provided by themselves. The general supervision of library work is lodged in the Public Library Commission, which has charge of a system of traveling libraries furnished by the State. It also maintains a school for the training of librarians engaged in the work in Indiana.

Churches.—The principal religious denominations of Indiana in the order of their strength are the Methodists, Roman Catholics, Disciples or Christians, Baptists, Presbyterians, United Brethren, and Lutherans.

Charitable and Penal Institutions.—The State maintains 9 charitable and 4 penal institutions, at an annual cost of over \$1,500,000. Of the former, 4 are hospitals for the insane located respectively at Indianapolis, Logansport, Richmond and Evansville. On 31 Oct. 1902, these had 4,039 inmates. The annual cost of maintenance was \$649,834.54, or \$173.79 per capita. The other charitable institutions are the Institution for the Blind, Indianapolis, inmates 127, per capita cost \$276.40; Institution for the Deaf, Indianapolis, inmates 318, per capita cost \$231.66; Soldiers and Sailors' Orphans' Home, Knightstown, inmates 603, per capita cost \$174.52; Soldiers' Home, Lafayette, inmates 739, per capita cost \$167.30; School for Feeble-Minded, Fort Wayne, inmates 318, per capita cost \$127.05. The correctional institutions are the State Prison, Michigan City, inmates 796, per capita cost \$133.32, earnings \$53,395.86; Indiana Reformatory, Jeffersonville, inmates 923, per capita cost \$130.68, earnings \$62,350.67; Reform School for Boys, Plainfield, inmates 531, per capita cost \$122.13, earnings \$298.91; Industrial School for Girls and Women's Prison, Indianapolis, inmates 52 women and 175 girls, per capita cost \$191.55, earnings \$1,436.69. At the legislative session of 1903 a law was passed for the division of the last named institution and the establishment of a new Industrial School for Girls. The State has the convict-contract-labor system, but efforts have been made to abolish it, and the legislature of 1903 provided for a commission to investigate and report on the subject. The convict labor is all done within the prisons. The State has the indeterminate sentence system with commutation of time for

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good behavior. In addition to the State institutions each county maintains a poor asylum. In these, and the Marion County asylum for the incurable insane, there were on 31 Aug. 1902, 3,046 inmates, of whom 1,975 were men and 1,071 women. Of these inmates 518 were classed as insane, and 889 as feeble-minded. There are in the State 46 orphans' homes, in which there were on 31 Oct. 1902, 1,565 inmates, of whom 1,025 were boys and 540 girls. At the same date the Board of State Charities reported 811 orphan children maintained in private homes, without public expense.

State Government.—The elective State offices are held for periods of 2 years, with eligibility restricted to 4 years in any period of 6 years, except as to the governor, lieutenant-governor, and geologist, whose terms are 4 years. No one is eligible to the office of governor or lieutenant-governor for more than 4 years in any period of 8 years. The governor's salary is \$5,000, with an allowance of \$1,800 for house rent. The governor's veto power extends to all laws passed by the legislature, but the veto may be overthrown by a majority vote in both Houses. The legislature meets once in 2 years, and may be called in special session by the governor; regular sessions are limited to 60 days and special sessions to 40 days. The Senate is composed of 50 members elected for 4 years each, and the House of 100 members elected for 2 years each. The members receive \$6 a day while in session, and \$5 for each 25 miles traveled in reaching the capital and returning home. The State is required to be redistricted for legislative purposes every 6 years. The present Constitution was adopted in 1851, and is very generally considered unsatisfactory, especially as to legislative representation and the location of the appointing power. It can be amended only by the majority vote of both Houses of two consecutive legislatures, followed by a majority vote of the electors of the State.

Congressional Representation.—The State has 13 representatives in Congress.

Population and Divisions.—The population of Indiana territory in 1800 was 5,641, but only about 2,500 of this was within the boundaries of the State. In 1810 the population of the territory, with practically the same boundaries as the State, was 24,520. A territorial census taken in 1815 showed 63,897 inhabitants. After the admission of the State the census returns were as follows: 1820, 147,178; 1830, 343,031; 1840, 685,866; 1850, 988,416; 1860, 1,350,428; 1870, 1,680,637; 1880, 1,978,301; 1890, 2,192,404; 1900, 2,516,402. Of the population in 1900, 142,121 were foreign born, and 57,505 were negroes. The tendency of the negroes is to gather in the cities, more than one fourth of the entire number being found at Indianapolis, and an eighth at Evansville.

The State has 92 counties, whose names and county-seats are as follows:

Adams, Decatur.
Allen, Ft. Wayne.
Bartholomew, Columbus.
Benton, Fowler.
Blackford, Hartford City.
Boone, Lebanon.
Brown, Nashville.
Carroll, Delphi.
Cass, Logansport.
Clark, Jeffersonville.
Clay, Brazil.
Clinton, Frankfort.

Crawford, English.
Daviess, Washington.
Dearborn, Lawrenceburg.
Decatur, Greensburg.
DeKalb, Auburn.
Delaware, Muncie.
Dubois, Jasper.
Elkhart, Goshen.
Fayette, Connersville.
Floyd, New Albany.
Fountain, Covington.
Franklin, Brookville.

Fulton, Rochester.	Orange, Paoli.
Gibson, Princeton.	Owen, Spencer.
Grant, Marion.	Parke, Rockville.
Greene, Bloomfield.	Perry, Cannelton.
Hamilton, Noblesville.	Pike, Petersburg.
Hancock, Greenfield.	Porter, Valparaiso.
Harrison, Corydon.	Posey, Mt. Vernon.
Hendricks, Danville.	Pulaski, Winamac.
Henry, Newcastle.	Putnam, Greencastle.
Howard, Kokomo.	Randolph, Winchester.
Huntington, Huntington.	Ripley, Versailles.
Jackson, Brownstown.	Rush, Rushville.
Jasper, Rensselaer.	Scott, Scottsburg.
Jay, Portland.	Shelby, Shelbyville.
Jefferson, Madison.	Spencer, Rockport.
Jennings, Vernon.	Starke, Knox.
Johnson, Franklin.	Steuben, Angola.
Knox, Vincennes.	St. Joseph, South Bend.
Kosciusko, Warsaw.	Sullivan, Sullivan.
Lagrange, Lagrange.	Switzerland, Vevay.
Lake, Crown Point.	Tipppecanoe, Lafayette.
Laporte, Laporte.	Tipton, Tipton.
Lawrence, Bedford.	Union, Liberty.
Madison, Anderson.	Vanderburg, Evansville.
Marion, Indianapolis.	Vermilion, Newport.
Marshall, Plymouth.	Vigo, Terre Haute.
Martin, Shoals.	Wabash, Wabash.
Miami, Peru.	Warren, Williamsport.
Monroe, Bloomington.	Warrick, Boonville.
Montgomery, Crawfordsville.	Washington, Salem.
Morgan, Martinsville.	Wayne, Richmond.
Newton, Kentland.	Wells, Bluffton.
Noble, Albion.	White, Monticello.
Ohio, Rising Sun.	Whitley, Columbia City.

Chief Cities.—The largest city in Indiana is the capital, Indianapolis, with a population (1900) 160,164. Next in size are Evansville (59,007), Ft. Wayne (45,115), Terre Haute (36,673), and South Bend (35,999). Each of these cities has a charter specially made for it, though under guise of a general law. These charters are of recent creation—the oldest made in 1891—and establish advanced forms of city government. Of cities of secondary importance may be named Muncie (20,942), New Albany (20,628), Anderson (20,178), Richmond (18,226), Lafayette (18,116), Marion (17,337), Logansport (16,204), and Elkhart (15,184). There were in all 80 cities and 330 incorporated towns in the State in 1901.

History.—The first-known visits of white men to Indiana were those of Sieur de la Salle, who followed the Ohio River along its southern boundary in 1669-70, and crossed its northwestern corner by way of the St. Josephs-Kankakee portage in 1671. There were no Indians living below the Wabash at that time, and probably not many in the northern part of the State, but those there were LaSalle induced to join his confederacy against the Iroquois, and they all removed to the Illinois River, leaving Indiana practically uninhabited. After some years they began moving to the East, reaching Detroit by 1712, and shortly afterward located at points along the Maumee and Wabash rivers. The Delawares, who afterward lived in the central part of the State, on White River, came there about 1750. It is probable that the French first placed representatives at the Indian villages near the site of Ft. Wayne, and next, about 1720, at Ouiatenon—on the north side of the Wabash just below Lafayette—and that there were stockade forts at these places, but there is nothing to indicate a permanent settlement at either place. The post at Vincennes was established in 1731, largely under the influence of Father De Beaubois, a Jesuit who had been stationed at Kaskaskia. Families located there soon afterward, and it remained a permanent settlement, though there is but one land grant recorded of

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date prior to 1736. The French posts were small and unimportant, and the history of the region under French and British rule presents no very striking features. In 1778 Vincennes was surrendered to representatives of Gen. George Rogers Clark, and the Wabash country was brought under American control. A recapture by the British was followed by a second taking by Clark in 1779. The region was ceded to the United States by the treaty of 1783, and was included in the Territory northwest of the Ohio River, by the ordinance of 1787. It was thus governed until 1800, when Indiana Territory was formed, including all of the Northwest Territory except Ohio. From Indiana Territory, Michigan Territory was cut off in 1805, and Illinois Territory in 1809, leaving it with practically the present State boundaries. By act of Congress of 19 April 1816, Indiana was authorized to form a State government, and the State was formally admitted by act of 11 Dec. 1816. In the meantime a State Constitution had been adopted on 29 June; State officials had been elected, and the State government had been actually inaugurated on 7 November.

There were almost continuous Indian troubles in the Ohio Valley from 1788 to 1795, when, after Gen. Wayne's successful expedition, peace was made at Ft. Greenville. After that date the American immigration began, and there was no material trouble with Indians until the formation of Tecumseh's confederacy in 1811. The Indians were overwhelmed at the battle of Tippecanoe (q.v.) on 7 November of that year, by the troops under Gen. Harrison, and sued for peace, but when the war with England came on there were Indian hostilities of minor importance continuing until the close of the war in 1815. After that year there was a gradual extinction of Indian titles, the Indians being concentrated in the northern part of the State and finally removed west of the Mississippi. The last removals occurred in 1836 and 1838.

The sobriquet "Hoosier," commonly used to designate the State and its people, was first applied to them about 1830. It was not coined for that purpose, as is commonly supposed, but was a slang word signifying an uncouth rustic, which was in common use in the South at that time, and is still commonly used there in that sense.

The history of the State after its admission was chiefly that of peaceful development—clearing lands, opening roads, building towns and cities, and establishing industries. The most notable feature was the disastrous internal improvement enterprise on which the State entered in 1836. It contemplated transportation routes on 7 main lines, involving the construction of 1,289 miles of railroads and canals. That the routes were fairly well chosen is shown by the fact that they are now practically all occupied by successful railroad lines. The chief defect was that the improvements were mostly high-line canals, and the breaks in these before completion caused such great damage that the estimated cost was enormously increased. The financial panic of 1837 added to the difficulties, and the effects of this were aggravated by the general entering of the States on such enterprises on borrowed capital. The total debts of the several States swelled from about \$13,000,000 in 1830 to \$207,894,613 in 1842. In 1839 Indiana was unable to realize on the sales of her bonds, and was forced to default interest

on those already issued. The canals and roads being unfinished, did not furnish the revenues anticipated. Compromises were effected by which the work done was turned over to creditors, but the State was left with a debt of about \$10,000,000 without any property to represent it. In all, Indiana built 453 miles of canals, at a cost of \$7,725,262, all of which are now abandoned so far as transportation is concerned. But under private management, and more favorable conditions, the transportation lines developed rapidly, and in 1849 the one railroad originally contemplated was paying 8½ per cent dividends on its stock. In 1860 there were 2,126 miles of railroads in successful operation in the State.

In the war with Mexico, Indiana furnished troops to the number of 4,470. Of these there were killed and wounded 183, and died of other causes 218. When the Civil War began the State occupied an important position, and its resources were utilized to the uttermost by its war governor, Oliver P. Morton. The State furnished 106,363 men for the War, and 784 paid for exemption, or in other words supplied 74.3 per cent of her total population capable of bearing arms, by the census of 1860. Only one State in the Union surpassed or equaled this record, Delaware being credited with 74.8 per cent of her military population. But of the supply credited to Delaware nearly one tenth was in money commutation for exemption, and nearly one tenth of the men in actual service were colored. On the basis of white troops furnished for 3 years or more of service, Indiana supplied 57 per cent of her military population of 1860, and on this basis was surpassed only by Kansas, which is credited with 59.4 per cent. Of the troops sent by Indiana 7,243 were killed or mortally wounded in battle, and 19,429 died of other causes, making a total death loss of over 13 per cent of all troops furnished. One feature of the War period in Indiana, and some adjoining States, was the formation of secret treasonable societies known as Knights of the Golden Circle, and later Sons of Liberty. These attracted much attention at the time, and much comment later, but in reality they were neither extensive nor dangerous. They were organized with a system of "circles within circles," with mysterious rites and blood-curdling oaths, but the masses of the members understood that they were merely for mutual protection, and the treasonable designs were affairs of the inner circles. Among their members there were a number of government detectives who kept the authorities informed as to every movement, and at the final exposure the chief witness for the government was Felix Stidgers, a detective who had become so prominent in the order that he was made "Grand Secretary for Kentucky," and knew all of the secrets of the order. As is aptly stated by Gov. Morton's biographer, "No one can read the history of the secret organizations in Indiana and not feel that, widespread as they were, there was not an instant in which they were not securely within the grasp of the war governor." After the War, Indiana became peculiarly a political battleground. In 1868 the Republicans elected Conrad Baker governor by less than 1,000 plurality, and in 1872 the Democrats elected Thomas A. Hendricks to that office by the narrow plurality of 1,148, although Gen. Grant received the vote of the State for President. After 1872 neither

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party carried the State at two consecutive Presidential elections until after 1896, and neither carried it by a majority of all the votes cast, or by a plurality of as much as 20,000. One result of this close balance has been an improvement in State legislation, the Democrats leading in the legislature of 1889 which they held although they had lost the State offices and the Presidential vote of the State in the preceding year. Indiana in that year adopted the Australian ballot system, being the second State in the Union to do so, with some improvements that have been extensively copied. Other notable reform laws are a school-book law that has made a large reduction in the cost of books used in the common schools; a Board of State Charities law that has greatly improved the charitable and penal institutions of the State; a fee and salary law putting officials on salaries and requiring the payment of all fees into the public treasuries; a compulsory education law; laws for the encouragement of public libraries; laws for the incorporation of cities which provide the most modern modes of city government; laws for the reform of county and township government providing supervisory boards to which local legislation is entrusted and a tax law that has been largely effective in equalizing taxation and has been copied elsewhere. Another feature of Indiana's development that has attracted notice in later years is its production of native writers of poetry and fiction. Among the former may be named Joaquin Miller, John Hay, John James Piatt and James Whitcomb Riley; among the latter Gen. Lew Wallace, Maurice Thompson, Edward Eggleston, Charles Major, Meredith Nicholson, Booth Tarkington and Annie Fellows Johnston. These with lesser lights and some writers of note in other lines form a notable group for a commonwealth whose settlement and development have occurred in little more than a century.

JACOB PIATT DUNN,
Secretary Indiana Historical Society.

Indiana University, the State university located near Bloomington. In accordance with a provision of the State constitution, the legislature passed an act in 1820 providing for the establishment of a State seminary, which was opened in 1824 under the name of Indiana Seminary; in 1827, it was raised to the dignity of a college, and in 1838 the name was changed to Indiana University. In 1869 the university was opened to women, and has since been coeducational in all its departments. The university is the head of the public school system of Indiana, and no tuition fee is charged; the government is by a board of trustees which reports biennially to the governor. Courses are offered in languages, science, and history, all graduates receiving the degree of A.B. The degrees of Ph.D. and A.M. are given for graduate work; there is also a school of law connected with the university which confers the degree of B.L. There is a biological experiment station on Winona Lake, under university control, and a summer session is maintained. In 1902 the annual income amounted to \$140,000; the number of students was 1,285.

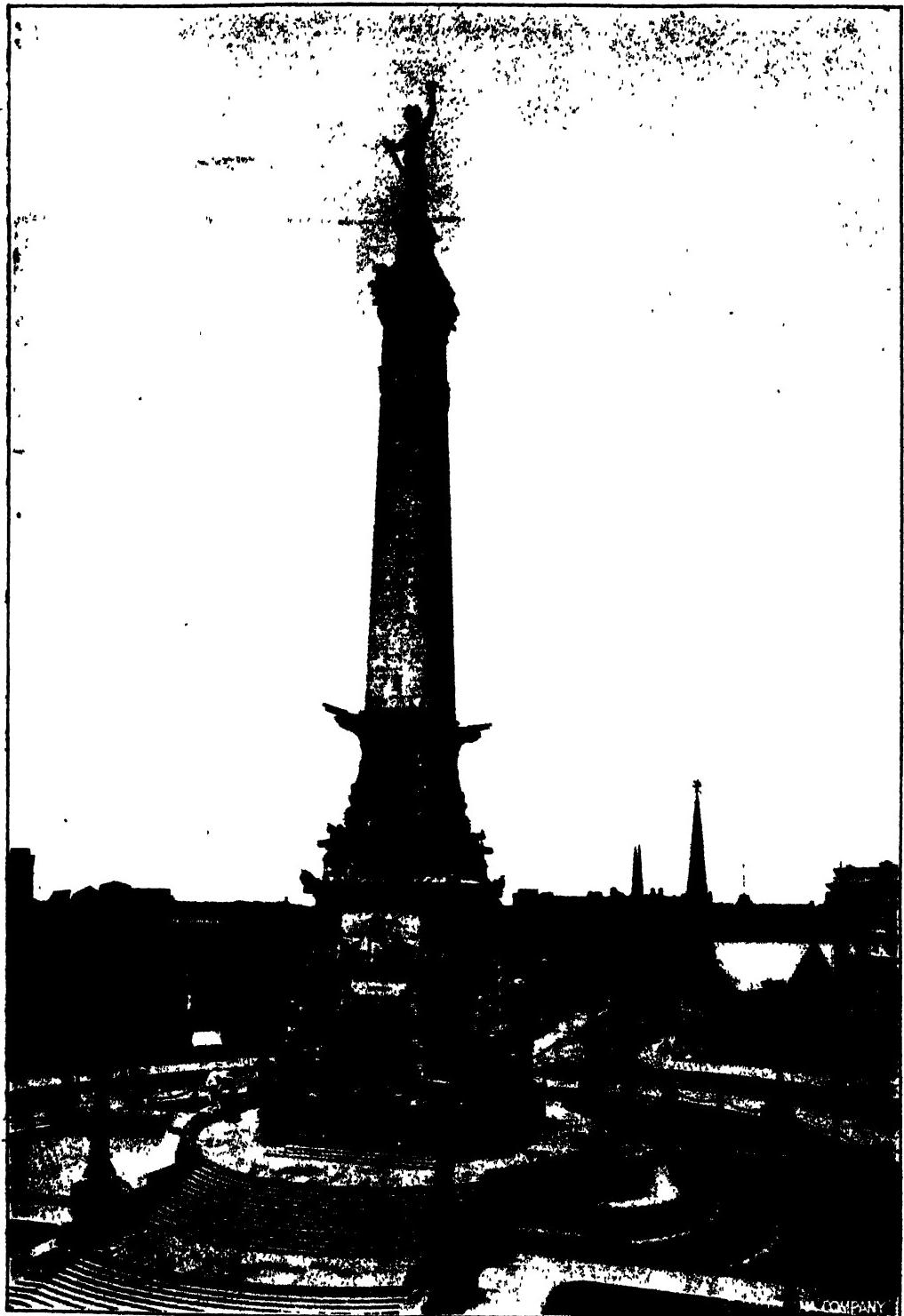
Indianapolis, Ind., capital of the State, county-seat of Marion County, the largest city in the State and the 21st in the United States; situated on the west fork of White River. It is

the centre for 16 radiating railroads, which connect it with Chicago, 184 miles northwest, Cleveland, 283 miles northeast, St. Louis, 240 miles southwest, Louisville, 110 miles south, Cincinnati, 111 miles southeast, Columbus, 181 miles east, New York, 819 miles east, and other termini in Ohio, Michigan, Illinois, and Indiana. Its area is 29.35 square miles.

The site was selected in 1820 as the location of the capital by a legislative commission, and its name was adopted by the legislature in session at Corydon, 6 Jan. 1821. The first plat included a square mile, which was laid out with broad rectangular streets and avenues radiating from a central circle. The character of the plan was undoubtedly influenced by l'Enfant, the designer of the city of Washington, D. C., for one of the surveyors who made the town plat had aided in the work at the national capital. While the additions to the city have not been developed upon the same broad lines, most of them have been treated liberally and the city is noted for its wide streets, well paved and beautifully shaded. The city is very level, nearly all of its area being 700 to 800 feet above sea-level. There are 439.6 miles of platted streets, of which 92 miles are paved, 44 miles with asphalt, 27 miles with brick, 17 miles with wooden blocks, and 4 miles with macadam. The chief business streets are Washington Street, which is a section of the old National road projected and partly completed to run from Baltimore to St. Louis; Market, Maryland, and Georgia streets, all running east and west; Meridian, Pennsylvania, Delaware, and Illinois streets, running north and south, and Massachusetts, Indiana, Virginia, and Kentucky avenues, which are diagonals, radiating from the circular Monument Place. This central circle contains the State's monument to its soldiers and sailors, perhaps the most successful of the innumerable monuments erected by towns, cities, societies, and States in commemoration of the nation's defenders, and is generally regarded as one of the greatest in the world from an artistic point of view. The finest residence streets are Delaware, Meridian, and Pennsylvania. Several other residence districts are particularly well designed and cared for, such as Woodruff Place—a residence park, with esplanades, fountains, statues, etc.—which has a town government of its own, though completely surrounded by the city; Morton Place, and Meridian Heights.

Public Service.—The first water supply and the first sewer system were constructed in 1870 to 1875, and but little else was done in the way of comprehensive public improvements until after the adoption of the present efficient charter in 1891. Prior to that year the city government had been by mayor and council. Public-spirited citizens who recognized the impossibility of comprehensive public improvements, through the Commercial Club and Board of Trade agitated the adoption of the new charter, which separated the legislative and administrative functions of the city government, making the mayor and his appointees fully responsible for the latter. The first Board of Public Works devised a broad system of improvement, including sewerage, paving and street cleaning, which was supplemented in 1895 by a Park Commission. Under these two boards the progress in the establishment of municipal public works adding to the beauty and convenience of the city has been rapid. As a step preliminary to the era of im-

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provement which began in 1890 a paving exposition was held for the purpose of educating the people of the city regarding paving materials and methods. It was the first ever held in America and attracted attention throughout the country. Official delegations were sent to it from many cities. Prior to 1890 less than two miles of pavements had been laid. The amounts expended since the adoption of the new charter in 1891, including the year 1902, are as follows: for pavements of asphalt, \$2,726,668.01; brick, \$1,011,214.39; wooden block, \$969,652.82; macadam, \$154,522.91; gravel, \$757,112.50; for alley improvements, \$46,655.26; for cement walks, \$879,610.21; for brick walks, \$65,995.41; making a total for paving of \$6,611,431.51. During the same period the expenditure for construction of 105 miles of sewers added to the 23 miles previously in use was \$1,828,878.67, and for bridges \$240,485.32. The grand total for the 12 years shows \$8,680,795.50 expended in these departments of public improvements. The waterworks owned by the Indianapolis Water Company have developed with the city. The system of pumping by direct pressure is used, and a system of filter beds to purify the water taken from White River some miles above the city has been installed. The company has 226 miles of water mains and receives from the city about \$85,000 a year for public water and fire protection service. Electric lights are in general use. The city pays about \$115,000 a year for about 1,350 electric arcs for street lighting and about \$7,000 for about 400 gas and vapor lights. The police department contains 175 men and costs \$150,000 a year. The police court, city clerk, city dispensary, and central station are housed in a handsome building of recent construction. The fire department has 100 horses, 9 steam fire-engines, 20 hose wagons, 1 water tower, 1 aerial, and 4 service trucks, 4 chemical engines, and 175 men, and is housed in 22 stations. It costs the city \$175,000 a year. There are 50 miles of underground conduits used by the telephone, telegraph and electric light and power companies, and 125 miles of electric street railway lines, owned by the Indianapolis Street Railway Company. The city is the most prominent centre of interurban railway traffic in the United States. Ten systems are in operation or in active construction, and others are early probabilities. The city has recently made a contract with the Indianapolis Terminal and Traction Company, lessee of the city lines, under which a great terminal station and belt lines for the passenger and freight traffic of the interurban lines are under construction, the whole making a model system.

Parks and Cemeteries.—The public park system includes 9 parks of nearly 1,200 acres area. Riverside Park, purchased in 1898, contains 950 acres along White River, Garfield Park 108 acres, and Brookside Park 80 acres. Since the establishment of the park commission in 1895 \$300,000 has been spent in purchasing new parks and \$400,000 in improving them. There are several small parks scattered about the city, such as Military Park, 14 acres; University and St. Clair Squares, each 4 acres; Spades Place, 8 acres; Indianola Place, 2 acres; Highland Square, and combinations of park, boulevard, and residences as Elmwood, Fletcher, Morton, and other places, of which the largest is Woodruff Place, above noted. The city street railway company maintains two parks a short distance

outside the city limits. The first cemetery of the city, Greenlawn, has not been used as such for many years and is kept in park form by the Board of Park Commissioners. Crown Hill cemetery, one of the notable cemeteries of the country, embraces over 540 acres. There are also Roman Catholic, Lutheran, and Jewish cemeteries.

Buildings.—The Indiana State House, costing \$2,000,000, and built of Indiana colitic stone, is perhaps the most notable building. With its grounds it occupies two large blocks. The county building was completed in 1878 at a cost approximating \$1,750,000. The new Federal building, containing the post-office, custom-house, and United States courts, is under construction at a cost of \$2,400,000. Other municipal buildings of note are the police building, the public library, containing also the offices of the public schools, and some of the new public school buildings. Tomlinson Hall, a bequest by Dr. J. M. Tomlinson, is a public building, its lower story being used as a market. The Indianapolis Art Association is considering plans for an art museum and school. Among the prominent business buildings ornamenting the city, special mention may be made in the order of their construction of the Commercial Club, Majestic, Law, Stevenson and Newton Claypool buildings and Claypool Hotel. The Columbia Club building is an important feature of one quadrant of Monument Place, which surrounds the Indiana State Soldiers and Sailors' monument. This massive shaft is the central and most notable decorative feature of the city. It is 285 feet high, including the bronze statue, and its base is ornamented with symbolic groups of statuary and reliefs in stone and bronze. It was designed by Bruno Schmitz and cost over \$500,000. Four epochs in the history of the State are commemorated by the statues of George Rogers Clark, William Henry Harrison, James Whitcomb, and Oliver P. Morton, which are grouped about its base. The width of Washington street, 120 feet, and of the streets of the original plat, 80 and 90 feet, give space for the best possible display of architectural features.

Transportation.—Indianapolis is the centre of trade for the State. With the completion of the Indianapolis Southern Railway every county in the State except three, which are on the Ohio River, can be reached by railroad in less than one day's travel. Consolidations have placed most of the railroads in two systems. One of these, the Pennsylvania lines west of Pittsburgh, now operates the Madison and Jeffersonville lines, which reached the city in 1847, and the Vincennes line, completed in 1868; the Indiana Central to Columbus and the East, completed in 1853, and the Terre Haute and Richmond, later the Vandalia, completed in 1852, and now reaching St. Louis; also a line to Chicago, partly over the Lake Erie and Western. The other, the Big Four system, operates the Bellefontaine road to Cleveland, completed in 1852; the Indianapolis and Cincinnati, which reached the city in 1850; the Indianapolis and Lafayette, of 1852, now reaching Chicago; the Indianapolis, Bloomington and Western to Peoria, finished in 1870, its eastern extension to Springfield, O., completed about 15 years later; the Indianapolis and St. Louis, completed in 1876. Through trains are also run to Benton Harbor, Mich., and to Louisville, over branches of these lines. The

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Cincinnati, Hamilton and Dayton Railroad Company operates the Cincinnati and Indianapolis Junction road, completed in 1868, and the Indianapolis, Decatur and Springfield road to Springfield, Ill. The Indianapolis, Cincinnati and Louisville operates a line to Chicago, which was completed about 1880. The Lake Erie and Western Railroad Company operates the old Peru and Indianapolis road, completed in 1854, and reaches Michigan City, Toledo and Peoria.

The construction of the system of interurban electric roads began about 1890 with the Broad Ripple line, now a suburban city line. The next to be constructed was the Indianapolis and Greenwood line in 1900, now reaching Columbus, Ind. It was quickly followed by the Indianapolis and Eastern, which now connects with lines to Columbus, Ohio, and other Eastern points. The Union Traction Company entered the city with a line from its centre in Anderson in 1901 and completed a new line north to Tipton and other points in 1903. The Indianapolis, Shelbyville and Southeastern is another line completed in 1901. Lines entering the city in 1903 are the Indianapolis and Martinsville, the Indianapolis and Plainfield, and the Indianapolis and Northwestern, reaching Crawfordsville and Lafayette. The Indianapolis and Cincinnati is under construction in 1903 to Rushville, and contracts have been let for the Indianapolis and Southern railroad. The steam railroads are served within the city by the Union Railway Company owning the Union passenger station and the belt railway for facilitating the transfer of freight. The interurban electric roads will in like manner be served by the Indianapolis Terminal and Traction Company owning a large terminal station and belt lines for passenger and freight business.

Manufactures.—During the brief natural gas era in Indiana, Indianapolis benefited largely by the cheap fuel. Since the failure of the gas supply the superior shipping facilities of the city and relatively cheap coal fuel have attracted many more manufactoryes, and more than 160 industries are carried on in about 2,000 establishments. According to the United States census of 1900 there was invested in 1910 establishments capital amounting to \$36,828,114, employing 27,478 persons, including proprietors, and turning out products valued at \$68,607,579. Among the most important industries are slaughtering and meat packing, whose product was \$18,781,442 in the census year from 7 establishments; iron work of all sorts, \$6,727,990; flouring and grist mill products, \$3,820,373; carriages and wagons and material therefor, \$2,812,498; furniture factory product, \$1,685,827; saws, \$1,587,827; malt liquors, \$1,770,939; printing and publishing books and newspapers, \$2,924,385; clothing, \$2,190,050, half of it factory product; lumber and lumber-mill products, \$1,588,797.

Finances and Banking.—The assessed valuation of the city in 1870 was \$24,656,460. In 1891 at the beginning of the era of public improvements it was \$93,595,930, and in 1902 it had increased to \$132,927,210. The tax rate for State, county, township, city, and school purposes was \$2.08 in 1902. The bonded debt is \$2,421,000. The city's expenses are about \$1,200,000 a year. The post-office receipts are \$635,000. The custom-house receipts are \$165,000, and the valuation of imports \$350,000. There are 14 banks and trust companies, including seven national

banks. The aggregate capital of the national banks is about \$4,300,000, their surplus about \$1,900,000, and deposits over \$18,000,000. The six trust companies have a capital of \$2,900,000 and individual deposits of about \$7,500,000. The trust companies and private banks carry savings accounts. There are about 90 building, loan and savings associations in various stages of progress and liquidation.

Churches.—Indianapolis is the seat of a Roman Catholic bishop, with an auxiliary bishop and of an Episcopal bishop. Including missions there are 12 Roman Catholic churches in the city, 47 Methodist, 16 Presbyterian, 7 Episcopal, 34 Baptist, 10 Congregational, 7 Lutheran, 15 Christian, 3 German Evangelical, 3 Evangelical Association, 3 Friends, 2 United Presbyterian, 5 German Reformed, one each of 11 other denominations. There are 4 Hebrew congregations.

Charities.—In the city there are 15 hospitals, State, county, college, church, charitable, and private, 4 homes for the aged, 6 industrial schools and orphan asylums, 4 homes for women and girls, 16 organized charitable and relief societies, and several such institutions as the Y. M. C. A., Y. W. C. A., Friendly Inn, Bureau of Justice, Humane Society, Day Nursery. The township trustee is a source of official relief. The charities of the city are most efficiently administered, as a result of co-operation between organizations largely brought about through the efforts of Rev. Oscar C. McCullouch. In 1894 a plan of relief for the unemployed, whereby over 5,000 people were provided with the necessities of life throughout winter without pauperizing influences resulting, became widely known as the "Indianapolis Plan of Relief." It gave opportunity to worthy poor to earn credit at a market for food, fuel and clothing. The plan was devised and carried out on behalf of the people of the city by a Commercial Club committee composed of Hugh H. Hanna, Col. Eli Lilly, and William Fortune.

Education.—There are 60 public school buildings, including 2 high schools, one giving manual training, in which about 700 teachers are employed, with a total enrollment of about 35,000 pupils; 22 Catholic schools, 2 Lutheran schools, 5 private schools and academies, besides the schools in connection with institutions. The University of Indianapolis is an organization formed in 1896 to unite several institutions of the city, including Butler College, first incorporated in 1850 as the Department of Liberal Arts; the Medical College of Indiana, organized in 1869; the Indiana Dental College, organized in 1878, and the Indiana Law School. There are in all five medical schools, two dental colleges, a law school, and 21 business, music and other special schools. The United States Arsenal grounds in the city were purchased in 1902 for a technical institute. Free kindergartens are operated under the Free Kindergarten Association, and 23 kindergartens and a normal school are maintained largely from public funds, besides a number of private kindergartens. The Art Association of Indianapolis maintains the John Herron Art Institute, including art gallery, school, and museum. The Propylaeum is a building erected by an association composed exclusively of women.

Libraries.—The most notable libraries are the public library with about 100,000 volumes, under

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the control of the board of school commissioners, and the State library with about 35,000 volumes. The State law library with 40,000 volumes, and agricultural and horticultural libraries in the State House, and the county library and bar association's library in the court-house may be noted. There are seven branches of the public library, including the newly erected Bona Thompson library of Butler College and many small special libraries of schools and associations.

Newspapers and Literature.—In 1903 the city had 9 daily papers, 23 weeklies, 38 monthlies, and 5 with other periods of issue. The list of trade and class papers published in the city is particularly notable. Indianapolis is the home of many writers whose names are familiar to the public, and it has in recent years become an important western book-publishing centre.

Organizations.—The development of the city has been markedly influenced by organized work in various directions. There are a great number of literary, art, and musical societies, and largely as a result of this activity there is a high standard of cultivation in such matters. This has had a notable influence in establishing in the social life of the city a standard of merit rather than determining the standing of the individual on questions of lineage or wealth. There are many social clubs, among the most notable being the University, Country, Contemporary, and Woodruff Clubs, the Deutsche Haus, the Männerchor, and the Elks, while the Columbia, Marion, and Indiana Clubs are political organizations, established in comfortable homes. The Columbia Club building, located on the Circle, is one of the finest club-houses in the United States. The Commercial Club, with a membership of over 1,000, which owns as its home an eight-story office building, was a dominant force in the new era of progress and development which started in 1890, and devotes itself to the welfare of the city. The Board of Trade, an older organization with a membership of about 500, has also been active in this direction. Organizations of various kinds, commercial, trade, fraternal, social, literary, art, musical, and miscellaneous, number over 500.

Government.—The administrative department is in the hands of a mayor, elected biennially, and of boards appointed by him. The council consists of 15 members elected one from each ward, and 6 members elected at large, with a two-years' term of office. The city clerk and police judge are also elected biennially. The mayor's appointees are the city comptroller, attorney, civil engineer, boards of public works, 3 members of public health and charities, 3 members of public safety, and of commissioners of public parks 4 members. The school system is in charge of a board of 5 school commissioners elected at special elections held for that purpose only.

Population.—Beginning with two or three families in 1819 or 1820, Indianapolis has shown a steady and rapid growth, having a population of 1,085 in 1830; 2,668 in 1840; 8,091 in 1850; 18,611 in 1860; 48,244 in 1870; 75,056 in 1880; 105,436 in 1890; and 169,164 in 1900. Since the last census the increase in population has been still more rapid. The growth of the city has been almost exactly parallel with that of Buffalo, but 20 years behind, and the parallelism promises to continue. In 1890 Indianapolis was 26th

in population, and in 1900 it was 21st in the United States.

History.—The first settler, George Pogue, arrived in March of 1819 or 1820. The legislature of Indiana, meeting at Corydon, by committee selected, in 1820, the site for a State capital, and named it Indianapolis, 6 Jan. 1821. Another committee laid out the plat. Lots were slowly sold for several years, and the government was actually removed to the new capital in 1824, the first session of the legislature being held there in 1825. The first State House, modeled after the Parthenon, was completed in 1835. A town government was instituted in 1832 under three trustees, a town council was established in 1838, and a city government under mayor and council in 1847. The present metropolitan form of government, with the mayor as the responsible administrative officer and the council as the legislative branch, was adopted in 1891. A volunteer fire department was formed in 1826, which had much help from the State when the capitol building was completed. The first fire chief was appointed in 1853, and the department was changed to a corps of paid men in 1859. The police department was first established in 1854. The new town began to support a newspaper in January 1822, and a church in 1823. The first railroad reached the city in 1847, and several others were completed in the next four years. Their effect upon the town is seen in the large increase in population. The State capital was the centre of great activity during the War, and there was great expansion in business and manufactures as well as increase in population, most of which was retained. The city did its full share in raising regiments for the War, and is said to have expended a million dollars in contributions, bounties, and war expenses. Camp Morton, on its outskirts, was first a camp for training soldiers, and later for prisoners of war. The free school system now cited as a model by educational experts, was begun in 1853 with the accumulations of several years of special taxation spent in buildings and grounds. The Citizens' Street Railway charter was granted 18 Jan. 1864. The slaughtering and packing business, now so large a factor in the city's trade, began its great expansion in the same year. Public improvements were but few in number until the adoption of the new charter in 1891.

Indianapolis has numbered among her prominent citizens Benjamin Harrison, Thomas A. Hendricks, and others high in the affairs of the national government. *WILLIAM FORTUNE, Prest. Municipal Engineering Co., Indianapolis.*

Indianola, Iowa, city and county-seat of Warren County, 18 miles south of Des Moines, on the Chicago, B. & Q. and the Chicago R. I. & P. R.R.'s. There is a large and increasing trade here in grain, butter, eggs, fruit, live stock and garden products. Here is the seat of the Simpson Methodist Episcopal College, founded in 1867. The electric light plant is owned by the city. Pop. (1890) 2,254; (1900) 3,261.

Indians, American. Columbus, when he discovered America, believed he had reached a part of Asia, or of India, and in a letter of February 1493 wrote of "the Indians (in Spanish, *Indios*) I have with me." Thus the aborigines of the New World came to be called "Indians" (French *Indiens*, German *Indianer*,

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etc.), or, to avoid confusion with the natives of India, "American Indians," for which rather cumbrous term the word "Amerinds," susceptible of many modifications by means of prefix and suffix, and easily adaptable to the exigencies of modern European and other civilized languages, has been suggested by an eminent American lexicographer and is used more or less by a number of anthropologists and other writers. The word "American," originally applied to the Indians, is still somewhat in use, and Dr. D. G. Brinton styled his comprehensive sketch published in 1891, "The American Race"; but its employment to designate the white population of the continent seems to bar its ethnological application to the aborigines without some qualifying term. By some writers the Indians are called the "Red Race," and, more popularly, "Redskins" (in French *Peaux-Rouges*, in German *Rothäuse*), or "Redmen," terms of no exact somatic significance. A few American, and many European, ethnologists continue to separate the peoples who created the civilizations of Mexico, Central America, Peru, etc., from the Indians, while others exclude the Eskimo, and others, again, the "Mound-Builders." But somatic, cultural, and linguistic evidence justifies the conclusions of Powell and Brinton in using the term "American Indians" to include not only the aborigines now existing, or known to have existed since the discovery, but also all the pre-Columbian peoples of America concerning whom we have little data,—the most divergent are no more than sub-varieties of American man. This unity is the great ethnic phenomenon of American aboriginal history. The study of Indian languages, archaeological remains, arts, and industries, games, social and religious institutions, mythology and folk-lore indicates a general psychic unity, while the somatic diversities do not transcend those observable in the other great races of mankind. Whether one investigates, as McGee has so admirably done, the Seri of the Gulf of California, who represent about the lowest type of savage culture on the North American continent, or the Mayas of Yucatan, whose approach to a phonetic system of writing touches the high-water mark of Amerindian achievement, one receives the same impression: that it is a question not of very recent civilized or semi-barbaric intruders from Asia or from Europe, but of a race (whatever their remoter origins may be) who have dwelt for ages in an American environment, which has shaped them into the peoples met with by the whites at the time of the Columbian discovery. The limited effect of the "discovery" of the Norsemen may be held to discount any "discoveries" by Europeans before them; while, on the other hand, the American-Asiatic contact revealed by the investigations of the Jesup North Pacific expedition is as much American as Asiatic, and the "Bering Sea" culture is a local phenomenon no more fundamentally indigenous to the Old World than to the New. The arguments in favor of a trans-Pacific Malayo-Polynesian influence upon primitive America are no stronger than those that can be adduced to support the contrary opinion. The culture of the "Mound-Builders" does not in any way transcend the possibilities of what the American Indian was and is yet capable of, nor is it necessary to assume the presence of foreign culture-elements

to explain the civilizations of Mexico, Yucatan, Colombia, and Peru. Since very primitive times America has been essentially the "ethnic island" of Brinton, Keane, and other investigators. The impress of America has been upon the aborigines so long that physically, socially, linguistically they have been "Americanized" in so marked a fashion that their right to be considered one of the "races" of mankind is not to be dismissed without cause. To group them merely as a branch of the Mongolian, or, again, of the Malay "race," is to obscure many points of great importance in the prehistory of America or to ignore them altogether. The American Indian is in too many respects a modified (and anciently so) variety of mankind to be thought of as expressing in any serious degree the type of the Mongolian or the Malay.

Language and Culture.—The ethnic isolation of the American race has already been noticed. The apparent independence of the culture-centres of North and South America is another interesting fact. With the exception of a few possible traces of the presence of tribes of Arawak lineage in ancient Florida and the spread of art-motifs of the Caribbean type over a portion of the adjacent Gulf region, no direct evidence of the influence of South America upon North American culture is forthcoming. The independent origin of Mexican and Peruvian civilizations seems certain, and convincing proofs of the community of origin of Peruvian and Chibchan and even of Mexican and Mayan are lacking. The possibility of inter-cultural relations having once existed is, however, not to be denied. The Pacific coast, from the Gulf of California to the Argentine and Chile, has been a nursery of culture just as the Mediterranean area was for the Eurafican peoples. There has been a Mexico and a "greater Mexico," a Peru and a "greater Peru," while the Mayas and the Chibchas have also had their extensive spheres of influence. To the Pueblo culture north of Mexico corresponds the Calchaqui culture south of Peru. On the northern borders of Mexico still lie the savage Seri and Yaqui, and the culture-areas of Colombia and Peru have also their primitive frontagers,—and this was so in the time of the ancient Montezumas and the Incas. This juxtaposition of civilization and savagery is one of the characteristic facts of American ethnology, as it was once likewise of the history of the Mediterranean area in the Old World. In both areas we meet with a large number of peoples who rose above savagery, but, for some reason or other, failed to develop high stages of culture. That the more material evidences of civilization should be so confined to the Pacific coast is, to some writers, a significant fact suggestive of Asiatic relations; but the intellectual power of such Atlantic peoples as the Iroquois and some of the Muskhogean tribes of North America, and the moderate but distinct progress made by a few of the Brazilian tribes of the Atlantic area relieve us from any such theory, environment, and historical incident in America quite sufficing to account for the phenomena involved. (See ETHNOLOGY.) Certain other resemblances and contrasts in the various aspects of aboriginal culture in America merit attention here. At the extreme north of the continent, one stock, the Eskimo, with closely related forms of speech, kindred mythology, and folk-

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1. Labrador Eskimo Woman. 2. Mexican of the coast. 3. Mexican of the highlands. 4. Yucatan Indian Woman. 5. Ecuador Indian. 6. Peruvian Indian. 7. Brazilian Indian (Ipurina).
8. Dakota (Sioux) Indian. 9, 10. Apache. 11. Bellacoola (N. W. Coast). 12, 13. Pueblo Indians (New Mexico). 14, 15. Indians of Zapoteca, Mexico. 16. Bororo. 17. Carajá. 18. Botocudo. 19. Uruaua or Omagua (16-19 of Brazil). 20. Araucanian (Chile). 21, 22. Indians of Tierra del Fuego, with a child. 23. Patagolian.

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lore, similar customs and social institutions, etc., extends in a narrow line from east to west, even overflowing into Asia, while at the extreme south (much less extensive) the Fuegians, numbering altogether less than 10,000, are divided into three distinct linguistic stocks (Yahgans, Onas, Alikulufs). Eastern and northern North America, and the corresponding regions in South America, are areas of wide distributions of single stocks. The Pacific coast of America, as compared with the Atlantic, is a place where, in diverse spots, languages seem to pullulate. This region (including the narrow limits of Mexico and Central America) contained probably more independent tongues than all the rest of the continent. Indeed, within the present bounds of the State of California alone 22 such tongues are found, with several others in Nevada, and in Prof. Cyrus Thomas' list of the stocks of Mexico and Central America, made in 1902, nearly 30 are recognized.

The multiplicity of languages in primitive America has called forth explanatory theories of various sorts, among them Horatio Hale's suggestion of the origin of linguistic diversity through the spontaneous language activity of the child. As Gatschet has noted, the very existence of such a multitude of tongues all over America is proof that neither in ancient nor in later times has this continent been the scene, on a vast scale, of the suppression and extermination of peoples one by the other, which have been characteristic features of Old World history. In spite of the common belief to the contrary, mutual destruction was probably never so rife as when the coming of the white man introduced new means of warfare, and, crowding the natives for subsistence, led them to attack each other more effectively. The recent studies of Dixon and Kroeber in California have strengthened the view of a certain parallelism of language and culture.

That some culture-elements, however, have spread from tribe to tribe is shown by the distribution of certain inventions discussed by Mason, the northward movement of such plants as maize, the use of tobacco, the transmission of many themes and incidents of myths and legends (as demonstrated by Boas), the modes of occurrence of certain art-forms, etc. Interminglings of culture of a more or less local, though often of an extensive, character, have taken place in the Bering Sea area, in the Columbia River region, in the habitat of the Pueblo Indians of New Mexico and Arizona, in the southeastern part of the United States, in the Isthmian region of Central America, in Ecuador, in the Pampean country of the Argentine, etc.,—larger and more significant intermixtures have, perhaps, taken place in earlier times in Mexico, the Mayan country, Colombia, and Peru. A number of the borrowed culture-elements may be explained as the result of trade and commerce, by means of which useful or artistic objects, food, plants, etc., were easily conveyed long distances under primitive conditions. The widespread custom of adoption would also account for not a few instances of alien culture-grafts. So, too, with the exogamic marriage, when the women are culture-bearers. Where language-mixture has taken place it is more or less easily detectable in most American Indian 'stocks' and tongues. When families of the same stock possess, in the one case (Algon-

kian) dialects which differ as much as Micmac and Blackfoot, in the other (Iroquoian) as much as Cherokee and Mohawk, we are justified in looking for culture-differences as well in such widely separated peoples. Doubtless the results of careful somatological, sociological, and other investigations of the various tribes of American aborigines will furnish us ultimately with diverse ways of classifying them. At present, however, the most serviceable classification is a linguistic one, the result of the labors of Major J. W. Powell and the Bureau of American Ethnology, supplemented by the work of Dr. D. G. Brinton.

Linguistic Stocks.—The Bureau of American Ethnology has issued the Powell map showing the extent of the 58 linguistic stocks north of the Mexican boundary line; that is, of families or forms of speech, so independent of one another as to be catalogued as distinct stocks; apparently no more closely related than the Aryan and the Semitic families of the Old World. For South America no such authoritative map is extant. The exact number of such linguistic stocks in America has not yet been determined with certainty, but the following list probably represents the best view of the matter to-day:

1. Adaizan (Louisiana)
2. Algonkian (northeast North America)
3. Alikulufan (Tierra del Fuego)
4. Andaaquan (Colombia)
5. Arauan (northwest Brazil)
6. Araucanian or Aucan (Chile)
7. Arawakan (Central and N. E. South America)
8. Atacameñan (S. Bolivia)
9. Athapaskan (N. W. Canada, etc.)
10. Attacapan (Louisiana)
11. Aymaran (S. Peru, N. Bolivia)
12. Barbacon (S. Colombia)
13. Beothukan (Newfoundland)
14. Betoyan (Colombia-Venezuela)
15. Caddoan (Texas)
16. Calchaquian or Cata-mareñan (N. Bolivia)
17. Canichanan or Canisianan (N. Bolivia)
18. Carajan (S. Brazil)
19. Caribean (N. E. South America)
20. Cayubaban (N. Bolivia)
21. Charruan (N. E. Argentine)
22. Chetumachan (Louisiana)
23. Chiapanecan (Central America)
24. Chibchan (Colombia and Isthmian region)
25. Chimakuan (Washington)
26. Chimarikan (California)
27. Chinantecan (Oaxaca, Mexico)
28. Chinookan (Washington)
29. Chiquitan (N. Bolivia)
30. Chocoan (N. W. Colombia and Isthmus)
31. Chumashan (California)
32. Churoyan (Colombia-Venezuela)
33. Coahuiltecan (Mexico-Texas, mouth of Rio Grande)
34. Coconucan (S. Colombia)
35. Copchan (California)
36. Costanoan (California)
37. Cunan (Isthmus of Panama)
38. Doraskean or Changuinan (Panama and Nicaragua)
39. Eskimoan (Northern fringe of North America)
40. Esseleonian (California)
41. Guahiban (Venezuela)
42. Guaraunian (Venezuela)
43. Guaycuran (Gran Chaco, Paraguay-Bolivia)
44. Huavean (Isthmus of Tehuantepec)
45. Iroquoian (Ontario-Erie region, with offshoot in S. E. United States)
46. Itonsaman (Bolivia)
47. Jivaroan (Peru, Ecuador)
48. Kalapooian (Oregon)
49. Karankawan (Texas)
50. Kechuan or Quechuan (Peru)
51. Keresan (New Mexico, Pueblos)
52. Kiowan (Nebraska-Wyoming)
53. Kitunahan (S. E. British Columbia, N. Idaho)
54. Koloschan (Alaska)
55. Kulansapan (California)
56. Kusian (Oregon)
57. Laman (Peru)
58. Lencan (Central America)
59. Lulean (Gran Chaco)
60. Lutuamian (Oregon)
61. Mainan (Ecuador, N. W. Brazil)

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- 62. Mariposan (California)
- 63. Matacoan (Gran Chaco)
- 64. Matagalpan (Nicaragua)
- 65. Mayan (Yucatan, Chiapas, Guatemala, etc.)
- 66. Mocoan (Colombia)
- 67. Moquelumnan (California)
- 68. Mosetefian (Bolivia)
- 69. Moviman (Bolivia)
- 70. Muskhogean (S. E. United States)
- 71. Natchezan (Louisiana)
- 72. Onan (Tierra del Fuego)
- 73. Otomian (Central Mexico)
- 74. Otomacan (Venezuela-Colombia)
- 75. Palaihnihan (California)
- 76. Paniquitan (Colombia)
- 77. Panoan (Peru)
- 78. Payaguan (Gran Chaco)
- 79. Payan (Honduras)
- 80. Peban (Peru)
- 81. Piman (S. Arizona, N. W. Mexico)
- 82. Piaroan (Colombia-Venezuela)
- 83. Puinavan (Colombia-Venezuela)
- 84. Pujunan (California)
- 85. Puquian (Peru)
- 86. Quoratean (California)
- 87. Salivan (Colombia-Venezuela)
- 88. Salinan (California)
- 89. Salishan (British Columbia, etc., to the south)
- 90. Samucuan (S. Bolivia)
- 91. Sastean (California)
- 92. Serian (N. W. Mexico)
- 93. Shahaptian (Oregon-Idaho)
- 94. Shoshonean or Uto-Aztecian
- 95. Siouan (Carolinas and Missouri Valley)
- 96. Skittagetan (Q. Charlotte Is.)
- 97. Subtiabian (Nicaragua)
- 98. Tacanan (Bolivia)
- 99. Takilman (Oregon)
- 100. Tafoan (New Mexico, Pueblos)
- 101. Tapuyan (S. Central Brazil)
- 102. Tarascan (Michoacan, Mexico)
- 103. Tequistlatecan (Oaxaca, Mexico)
- 104. Ticuman (N. W. Brazil)
- 105. Timotean (Venezuela)
- 106. Timuquan (Florida)
- 107. Tonikan (Louisiana-Mississippi)
- 108. Tonkawan (N. W. Texas)
- 109. Totonacan (Veracruz, Mexico)
- 110. Tsimshian (British Columbia)
- 111. Tsonekan (Patagonia)
- 112. Tupian (E. Central Brazil)
- 113. Uchean (Georgia)
- 114. Ulvan (Nicaragua)
- 115. Wauiltapuan (Oregon)
- 116. Wakashan or Kwakiutl-Nootka (British Columbia)
- 117. Washoan (Nevada-California)
- 118. Weitspekan (California)
- 119. Wishoskan (California)
- 120. Xicaquean (Honduras)
- 121. Xincan (Guatemala)
- 122. Vahganan (Tierra del Fuego)
- 123. Yakonan (Oregon)
- 124. Yanan (California)
- 125. Yuraran (Venezuela)
- 126. Yukian (California)
- 127. Yuman (Lower California, Arizona)
- 128. Yucan (Peru)
- 129. Yurucarean (Bolivia)
- 130. Zaparoan (N. W. Brazil)
- 131. Zapotecan (S. E. Mexico)
- 132. Zoquean (S. E. Mexico)
- 133. Zufian (New Mexico)

Of the stocks enumerated, 51 belong to South America and 56 to North America north of Mexico. The status of investigation is such that the number assigned to South America is approximate only, and may ultimately be considerably increased or reduced. Some stocks, like the Adaizan, Beothukan (exterminated by whites), Chetimachan, and a few of the minor stocks in South America, are extinct or nearly so. A goodly number—including, for example, many of the stocks on the northwest Pacific coast, the Texas-Louisiana country, parts of Central America and the Pacific region of South America—were or are of limited area; others, like the Eskimoan, Athapascan, Algonkian, Siouan, Shoshonean, Arawakan, Cariban, Tupian, etc., are noteworthy by reason of the extent of their domain. Some, like the Kootenay, consist of practically a single language, while others, like the Algonkian, Siouan, Athapascans, Salishan, Aztecian, Mayan, Arawakan, Tupian, Cariban, etc., have developed numerous dialects, sometimes only remotely resembling the mother-tongue. Doubtless, with the perfection of linguistic research, some changes will be made in the list of stocks, or perhaps a method of groups may be devised in which stocks showing certain resemblances other than those of a lexical na-

ture may be classed together. The studies of Dixon and Kroeber indicate the possibility of this for the numerous Californian stocks, and a similar result may be predicted for certain other regions of the continent. As said, all the American Indian stocks are far from being of the same significance, many of them having hardly any historical importance. A few words about some of the most typical and most important must suffice here.

North American Stocks.—The Eskimoan stock is noteworthy by reason of being the first of all the aboriginal peoples of America to be visited by representatives of European culture,—the Norsemen in the 10th century, etc. It is also the only primitive people who, unaided by civilized races, occupy a portion of both hemispheres, for the Eskimo stretch from Labrador to a considerable distance within the borders of northeastern Asia. They illustrate the victory of man over a difficult environment, for they are a merry and sociable people in spite of the inclement and depressing character of their arctic surroundings. They have also a marked sense of humor, as the institution of the nith-song, or settlement of disputes by public judgment of the comparative merits of the two parties in competitive singing, would indicate,—the themes of the singing being the dispute and sarcasm at the expense of the opponent. The Eskimo are also very skilful carvers and engravers of ivory, their spirited drawings of animals, etc., resembling in marked fashion the similar art-products of prehistoric man of the French river-drift, a likeness which has induced some authorities (Dawkins, De Mortillet) to assume a racial connection between these two peoples. Mason has recently suggested that these drawings owe a good deal to the contact with Europeans (introduction of iron tools, etc.), but Boas considers that their close resemblance to the bark and rock pictographs of the Indians forbids the conclusion that these drawings are of other than native origin. The unity of language, and (to a considerable degree) of custom, mythology, etc., among the various Eskimo tribes is remarkable when one remembers the extent of their distribution. The use of the Eskimo dog with the sledge, the kayak, the harpoon, the snow-house (*iglu*), and the invention of many mechanical devices, show them to be gifted with native intelligence.

The Athapascans stock is notable for the contrasts in culture and diversities of culture-capacity presented by its members. Some of the Athapascans peoples of northwestern Canada and Alaska are among the lowest types of American man, and a few of them have hardly yet come to knowledge of the white man, the advent of the fur-trader being, according to J. M. Bell, a matter of the last two or three years in part of their domain. To this stock belong also the Apaches, once the terror of the civilization of the Southwest, whose depredations, in earlier times, disturbed the peace of the native civilization of Old Mexico. It is fair to say, however, of them that individual Apaches (Dr. Montezuma, for example) shows good capacity for adopting the chief elements of white American culture. Several small tribes of Athapascans are scattered through Washington, Oregon, and California, the most noteworthy being the Hupa, on Trinity River, the "Romans of California," as they have been called. The Navaho, who



THE SNAKE DANCE OF THE MOKI INDIANS.

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have assimilated to a considerable extent the culture of the whites, were good agriculturists before the coming of the Spaniards, from whom they adopted the sheep, a fact which modified their environment and their response to it. The contrast between the rude tribes of the "Barren Grounds" of Canada and the Navaho of New Mexico and Arizona is, as Horatio Hale pointed out, one of the most remarkable instances of culture-change by process of environmental variation on record. The recent loan-word *Klondike* comes from an Athapascans dialect.

The Algonkian stock, members of which were found from Labrador to South Carolina, and from the confluence of the Ohio and Mississippi northwesterly to the foot of the Rocky Mountains and the borders of the domain of the Athapascans, are of interest for many reasons. The great area over which they are spread has brought members of this stock into contact with many other Indian peoples,—the Naskopi, Crees, and northern Ojibwa with the Eskimo; the Micmacs with the Eskimo and Beothuk; the Ojibwa and related tribes of New England, New York, and Pennsylvania, the Lenapé of New Jersey, the Nanticoke, Powhatans, etc., of Maryland, Virginia, and the Carolinas with the Iroquois (who, both north and south, form an *enclave* in the Algonkian territory); the western Ojibwa, etc., with the Siouan tribes in the upper Mississippi region, and in the southern Mississippi country the Illinois and kindred peoples with the Caddoan and other stocks; the Blackfoot in the extreme northwest of the Algonkian area with the Athapascans Sarcees and the Kootenay. The aberrant Cheyennes and Arapaho (recently studied by Kroeber) belong to the Algonkian stock. Another evidence of the importance of this stock is the fact that many other stocks and tribes are known to us by names of Algonkian origin: *Eskimo*, *Athapaskan*, *Siouan*, and possibly also *Iroquoian* and *Muskogean*; *Chipewyan*, *Assiniboin*, *Mohawk*, etc. Of all the Indian stocks of North America none have made a greater impression upon the whites (French and English) than the Algonkian. This is seen when we remember that Powhatan and Pocahontas, King Philip, Pontiac, Tecumseh, Black Hawk, etc., the Indians who have appealed most to our historians, novelists, and dramatists, have all been of Algonkian lineage. This stock has also contributed to the vocabulary of spoken and written American-English some 140 words, of which many are hardly felt to be of Indian origin: *Carcajou*, *Caribou*, *Caucus*, *Chipmunk*, *Hickory*, *Hominy*, *Manito*, *Maskinonge*, *Menhaden*, *Moccasin*, *Moose*, *Mugwump*, *Opossum*, *Pappoose*, *Pemmican*, *Persimmon*, *Powwow*, *Pung*, *Raccoon*, *Sachem*, *Skunk*, *Squash*, *Squaw*, *Tammany*, *Terrapin*, *Toboggan*, *Tomahawk*, *Totem*, *Tump*, *Tuxedo*, etc. A people who have contributed to such a cosmopolitan tongue as English important words like *Caucus*, *Mugwump*, *Tammany*, and *Totem*, deserve more than passing mention. Our civilization owes to them also more material things than these,—tobogganning and lacrosse, canoeing (in large measure) and numerous devices of agricultural and domestic industry adopted by the early colonists from the aborigines. From the Algonkian Indians the whites also learned how to make maple sugar and maple syrup. (See AMERICANS.)

The Iroquoian stocks are famous through the confederacy of the "Five (afterward Six) Nations" and the great "League of the Iroquois" (so sympathetically studied by Morgan). Their physical characteristics at the time of the war of 1861-5 were "such that they exceeded the recruits of all other races (white included) in points of excellences demanded by military requirements. The high position occupied by woman among the Iroquois lifts them above many of their Amerindian kindred. The story of the Iroquoian statesman of the 16th century, Hiawatha, and his founding of the League that was to end all war and unite all the nations in one lasting bond of peace is a historical fact, which Longfellow's confusion of the Iroquoian patriot with the Algonkian demi-god Manabozho cannot altogether obscure. In political and social organization the Iroquoian tribes attained a position that was largely *sui generis*. The tale of their long struggle to preserve their independence against the whites will be found in Morgan and Parkman, while the Jesuit Relations contain their reaction to the efforts of the missionaries to convert them to the Christian faith, as well as the account of the fratricidal strife resulting in the extermination of the Hurons. The fame of the Iroquoian tribes (for example, Mohawks) as fierce warriors has caused the general public to neglect them in other respects. Through the researches of Horatio Hale and others it has been shown that the Cherokee of the Carolinas (recently so well investigated by Mooney) belong to the Iroquoian stock, together with several minor tribes in the south Atlantic region. This stock has produced a number of eminent men: Hiawatha (q.v.), Red Jacket (q.v.), Joseph Brant, and Dr. Oronhyatekha (q.v.), the present head of the Independent Order of Foresters; J. N. B. Hewitt, of the Bureau of American Ethnology at Washington, is also of Iroquoian blood. Sequoia, the half-blood Cherokee, who invented the alphabet now in use by his people, deserves mention here likewise. As compared with the prominent part played by them in the French-English and colonial wars, and in the Revolutionary War, War of 1812, etc., the Iroquoian people left little impression upon the culture and the speech of the English in America,—the words from their language which have crept into our own have been originally place-names: *Chautauqua*, *Conesoga* (horse), *Saratoga* (trunk), etc. To the French of Canada they have given a few more words. In the place-names of the region about lakes Ontario and Erie (Ontario, Niagara, Erie, Cataraqui, Oswego, Cayuga, Seneca, Onondaga, Tuscarora, Oneida, Ticonderoga, Tonawanda, Genesee, Ohio, etc.) the Iroquoian peoples are generously remembered, while their Cherokee kinsmen in the south have likewise left their impress upon the topographical nomenclature of the country. In both New York and Ontario, where considerable numbers of Iroquois still live, with no immediate danger of dying out, but particularly in the latter province on the Grand River Reserve, the pagan and Christianized Iroquois have existed side by side in the same community for so long a time as to make this phenomenon, the interesting details of which have been pointed out by David Boyle, of great value to sociologists.

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The Muskhogeon stock (Choctaws, Chickasaws, Creeks, Seminoles, etc.) as their subsequent career in the "Civilized Nations" of the Indian Territory with the Cherokee has shown, are among the most gifted intellectually of the aborigines of America. Gatschet notes as characteristic of this stock: Their color-symbolism for peace and war, their totemic system, the use of the "black drink," the doctrine of the "Master of Life," sun-worship, mound-building (some regard this stock as having been one of the so-called "Mound-Builders"), the ceremony of the *busk*, etc. This stock has had many intertribal wars, and the Creeks and particularly the Seminoles of Florida are famous for their contests with the whites.

The Siouan stock (Crows, Mandans, Assiniboin, Hidatsa, Sioux, Winnebagos, Omaha, Tuetos, Catawbas, Biloxi, etc.) are noteworthy by reason of their migration from the Atlantic slope in the region of the Carolinas to the trans-Mississippi and Missouri country, where their culture was conditioned by the presence of the buffalo and the adoption (from the whites) of the horse. Their wars with the surrounding tribes, particularly the Algonkian, and their subsequent numerous collisions with the whites (Minnesota massacre of 1862, the troubles in which Sitting Bull figured, etc.), are matter of history. The use of buffalo-skins made it possible for some of the Sioux tribes to develop pictography to a high degree. The researches of J. Owen Dorsey and Miss Alice Fletcher have shown the Omaha in particular to be gifted with a religio-social consciousness of a marked character, reflected in their name-giving and the ceremonies associated with the passage from childhood to manhood, in which individuality is much emphasized. That their capacity for producing men of ability is not confined to those of the primitive type (Sitting Bull) is indicated by the way in which individual members of this stock (Dr. Eastman, La Flesche, the collaborator of Dorsey, etc.) have responded to the stimuli of modern culture. The Dakotan federation is well remembered by the names of the twin States of the Northwest; Minnesota, Nebraska, etc., are terms of Siouan origin; while the minor place-nomenclature of the northwestern States contains a multitude of names from the same source.

The Shahaptian stock is noteworthy on account of the Nez Percés and the famous chief Joseph (still living), one of the most remarkable Indians of any age, whose "retreat" in 1877 has been compared to the celebrated march of the Ten Thousand of old.

The "Pueblos" Indians, as they are called from their village life, have risen in New Mexico and Arizona above the stage of savagery into a state of semi-civilization, representing the triumph of man over the adverse conditions of the desert and the inroads of fierce enemies of the lowest culture. Their relations to the so-called "Cliff-Dwellers" has been the subject of some ethnological speculation. (See PUEBLOS.) The diversity of culture among the Pueblos is not as great as that of speech. Besides the Moqui or Hopi, who belong to the Shoshonian stock, there are found in the Pueblos group three other distinct linguistic stocks,—Keresan, Tafoian and Zufian. The Pueblos culture has apparently been developed independently in several local centres, and the studies of Bandelier, Hodge,

Fewkes, Cushing, etc., have thrown much light on the origins and interrelations of stages of culture largely the reflex of environment.

The Shoshonean or Uto-Aztec stock offers the most wonderful contrasts in its members of any Amerindian stock. Linguistic and other evidence appears to justify the conclusion that not only certain peoples of the Sonoran country (Cahitas, Coras, Tepehuans, etc.), some of whom achieved a sort of half-civilization in contact with their more cultured neighbors, but the Bannacks, Shoshones, and Utes (even the wretched "Root-diggers") are kith and kin with the ancient Aztecs upon whose civilization Cortes intruded, and the tribes of Nahuatl lineage who carried that culture more or less from central Mexico to beyond Lake Nicaragua. The change from the low type represented by the Utes to the high type of the old Mexicans may have been due in large measure to environment. Intermediate stages are represented by some of the Sonoran tribes. The Mexican or Aztec branch of this stock has furnished to English and other civilized languages a number of interesting and valuable words: *Axolotl, chocolate, coyote, cacao, tomato, ocelot, chilli, copal, chinampa, jalap*, etc. The Moqui group of the Pueblos Indians belong also to the Shoshonean stock.

The Mayan stock (Cakchiquels, Huastecs, Tzotzils, Kekchis, Quiché, Tzendals, Mayas, etc.), creators of the civilization destroyed by the Spaniards in Central America, left, besides graven monuments in large numbers, other evidences of their having invented a system of "writing," which is the nearest approach by any of the aboriginal peoples of America to a phonetic method of record,—the solution of the Mayan hieroglyphics is perhaps the question of American archaeology. Their calendar-system, nagualism in religion, and the important role of woman in religious and social functions, deserve especial notice. The recent explorations of the Peabody Museum (Cambridge) have resulted in many new discoveries.

Central and South American Stocks.—The Chibchan stock, whose culture varied from that of the savage Arawacs of the mountains of Sta Marta to the civilization of the country about Bogota represent a rise from barbarism independent of that to the south in Peru, etc. There is some reason to believe that the "gold-culture" of the Chiriquí country and allied remains in the same region to the borders of Nicaragua may be due to the Chibchan stock,—the Talamanca, Guaymi, and a few other dialects of Costa Rica, etc., show affinities with Chibchan tongues. Their use and working of gold were of a high order, but neither in architecture nor in pictography could they compare with the Peruvians, the Mexicans, and the Mayas. They had a characteristic hero-legend of Bochica, and a tale of the great flood. The shrine of Lake Guatavita was a famous religious resort. Some of the famous "El Dorados" were in their territory. The Quechuan stock, which is best known through the civilization of the Incas, superimposed upon an older, widespread culture, represents but one phase of higher human activity in the Peruvian area. The extension of Quechuan language especially von Tschudi and Brinton agree in attributing not to the military achievements of this people, which antedated the

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A GROUP OF UTE INDIANS.

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coming of the Spaniards by only a few centuries, but to intellectual and culture influences millenniums old. The marks of their language can be traced from near the equator on the north to the Pampean tribes on the south. Common in the Peruvian area seem to have been a highly developed agriculture (stimulated, as in the southwestern United States, by the necessity for irrigation and artificial treatment of the soil),—maize, tobacco, potatoes, cotton, etc., the breeding of the llama and the paco, the making of pottery (useful and artistic), metal-working of a fine and ingenious sort, stone architecture more massive and imposing than artistically beautiful, or of the highest order as regards decorative art. The Inca form of government was never probably so far removed from the system common to most of the American stocks as some writers have believed. The Incasic conquest has caused the Peruvians to be styled the "Romans of America," but the analogy is misleading. Beyond the use of picture-writing and the employment of the quipu (knotted colored strings) for purposes of record, the Peruvians had not advanced, and the semi-phonic system, like that of the Mayas, was not developed by them. Ancestor-worship and sun-worship (state religion) were professed by the Peruvians, but the most far-sighted of their thinkers touched almost upon monotheism. The hero-god of the Peruvians was the sea-born Viracocha, about whom centred a rich and imaginative mythology. The mixture of races in the production of ancient Peruvian culture is indicated by the diversity of cranial type among the skulls from the old burial grounds and mummy-caves. North of the Quechuas, on the coast about Trujillo, were the Yunca-Chimus, etc., whose civilization is represented by the ruins of Gran Chimu and other remains in the valley of Trujillo, which preceded the period of Inca domination. Southeast of the Quechuan culture was that of the Aymaras on the Andean table-lands. To them are usually assigned the ruins of Tiahuanaco, near Lake Titicaca, which in their completeness were probably the most imposing structures raised by the hand of aboriginal man in America,—in architecture they differ in several notable ways from the buildings of Inca origin. Dr. Uhle has very recently sought to show the "succession of cultures" at Pachacamac, Trujillo, and their relations to that of Tiahuanaco. The Peruvian tongues have furnished modern English, etc., many words: *guano, condor, alpaca, pampa, paco, llama, coca, quinine, jerked (beef), vicuña, etc.*

In the northern part of the Argentine Republic (Province of Jujuy, etc.) the architectural and archaeological remains brought to light by recent investigators (Ambrosetti in particular) indicate the presence of a "civilization,"—village life in a desert environment, offering striking analogies with the culture of the Pueblos Indians of Arizona and New Mexico. This Calchaqui culture is evidently much more than the mere reflex of Quechuan-Aymaran conquest which it was formerly considered to be. Its origin and growth, however, remain to be clearly demonstrated.

The Araucanian stock, whose language has been studied by Lenz, are famous for their long resistance to the Spanish arms (the story of the "conquest" has been written in the last few years by Guevara), part of which

gave rise to De Ercilla's epic of 'La Araucana.' To the Araucanian stock belong tribes on both sides of the Chilean Andes and a number of the nomadic peoples of the Pampas, where they seem to be intruders rather than aborigines. Chilean Spanish has borrowed many expressive terms from Araucanian.

The Patagonians, Tzene, or Tehuelche, famous since the time of Pigafetta as "giants" (many of them exceed six feet and some are said to reach seven). To them belongs the "Setebos" of Shakespeare's 'Tempest.'

The Tapuyan stock of Brazil is looked upon by some authorities as the oldest people of the continent—some would affiliate with them the Fuegians, in this respect—representing a race once inhabiting a great part of South America. The man of the caves of Lagoa Santa and the man of the remarkable *sambaquis* or shell-heaps of the Brazilian coast are by many authorities considered to have related to the Tapuyans. Characteristic modern Tapuyans are the Boto-cudos, so called from the labret they wear in the lower lip. According to Ehrenreich, some of these ancient men of Brazil show affinities with prehistoric man of eastern Europe.

The Tupian stock (or Tupi-Guaranis, as they are also called), whose language was much used by the missionaries for general intercourse with the natives and is the basis of the *lígoa geral*, or "common language" of the region of the Amazons, were perhaps the highest in culture of the Brazilian tribes, having the elements of agriculture, village life, pottery (well developed and rather artistic), urn-burial, etc., but nothing beyond the Stone Age. Intermixture with both whites and negroes has taken place in the Tupi area, and the rich and imaginative tales of animals, etc., belonging to Tupi mythology have thus been given a wider extension, while negro and white influences have made themselves felt, both on the language and the literature of these people. According to Hartt, the Tupi language has influenced the Portuguese of Brazil quite as much as has the latter the former. Tupi-Guarani speech has furnished to the various European tongues a considerable number of words—to English, *ipecauana, jaguar, tapioca, tapir, toucan*, etc.

The Caribian stock were long famous for their cannibalism (the word *cannibal* is a corruption of one of their ethnic names), real and attributive, and their skill in making and using canoes. The shaman, or medicine-man, had great power among them, and they practised the curious and remarkable custom of the *couvade*. Rock-inscriptions and pile-dwellings are found in their territory. Some of them have been reduced to sad straits by the contact of the whites, but some of the Venezuelan tribes of this stock are still good, typical representatives of the American Indian.

The Arawakan stock, through its representatives (the Bahamian Lucayans, the natives of Haiti, Porto Rico, Cuba, etc.), was the first of the aboriginal peoples of the New World (exclusive of Greenland and Labrador) to come into contact with the white race, and likewise the first to come under its devastating influence. Many of the tribes of this stock were of a mild and gentle disposition, good agriculturalists, pottery-makers, workers in stone, wood and gold, and excellent canoe-men (the word *canoe* comes from an Arawak dialect). They were

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users of cotton, and to them we owe the first Indian invention adopted by the whites (*hammock*, both name and thing are Arawak). From the Arawaks, too, the Spaniards first learned the use of tobacco. Like the Caribs they practised the *couvade*. The name of the stock is said to mean "flour-eaters," on account of their use of cassava, which has also passed over to the white. The Arawak and Carib stocks have furnished to English and to the other civilized languages of Europe a large number of important words, the exact ethnic distribution of which is not easy to determine with exactness: *Agouti*, *anotto* (and French *roucouyenne*), *barbecuc*, *cacique*, *caiman*, *cannibal*, *canoe*, *cassava*, *colibri*, *hammock*, *hurricane*, *iguana*, *macaw*, *maize*, *manati*, *potato*, *tobacco*, etc. And with these names has gone the use of many of the things indicated and made known for the first time to Europeans. The debt of the Spanish and Portuguese settlers of South America and the West Indies is in these respects very great, for, naturally new fruits, plants, trees, etc., and many of their products came to be known by their aboriginal names or by corruptions of them. Thus a number of "balms" and "balsams" and other medicinal products retain in the pharmacopeia names of American Indian origin—*copaiba*, *tolu*, etc. Timber-trees, ornamental and dye-woods, have also largely kept their native appellations throughout Central and South America—the list would run into the hundreds. Large also is the catalogue of birds and other animals bearing Indian names.

Original Habitats.—The question of the original habitats of the important aboriginal stocks is one of the most interesting in American ethnology and archaeology. The researches of Rink and Boas in particular seem to have demonstrated that the primitive home of the Eskimo was in the region west of Hudson Bay, whence they spread northward and westward to Alaska, etc., and eastward (north and south) to the Arctic islands, Greenland and Labrador. See ESKIMOS.

The earliest habitat of the Athapascans was in northwestern Canada, to the westward of the home of the Eskimo. From there they migrated over the lake country, across the Rockies to the southward, leaving colonies along the Pacific to northern California, and sending out, through Arizona and New Mexico to the borders of the Nahuatl territory, the important branches of the Apaches and Navaho—the raids of the Apaches often reaching far into Mexico.

The original habitat of the Algonkian stock was, as Brinton and Hale have assumed, "somewhere north of the St. Lawrence and east of Lake Ontario," while that of the Iroquoian lay "between the lower St. Lawrence and Hudson Bay." The final result of the migrations and wars of these two stocks was to leave the Iroquois of the Ontario-Erie country entirely surrounded by Algonkian tribes. From their primitive home the Algonkian sent out numerous branches west, south, southwest, etc., making the extent of territory covered by them very large, and bringing them into immediate contact with many other Indian tribes and with the white settlers over a vast area. The Iroquois (in the Cherokee and the kindred tribes of the south) had branches, which were so separated from their northern kin as to be long taken for non-Iroquoian peoples.

The Muskogean stock, according to Gat-schet, have been from time immemorial inhabitants of the country between the Appalachian Mountains, the Atlantic, the Gulf of Mexico, and the Mississippi. The scene of their earliest development was in the neighborhood of the Mississippi, or possibly even beyond it.

The chief migrations of the Caddoan (Pawnee) peoples have taken place in historical times northward and southward from the Platte River, from which region they expelled in part the Siouan tribes, etc. If their own traditions are reliable, their primitive home lay farther to the south, on the Red River of Louisiana.

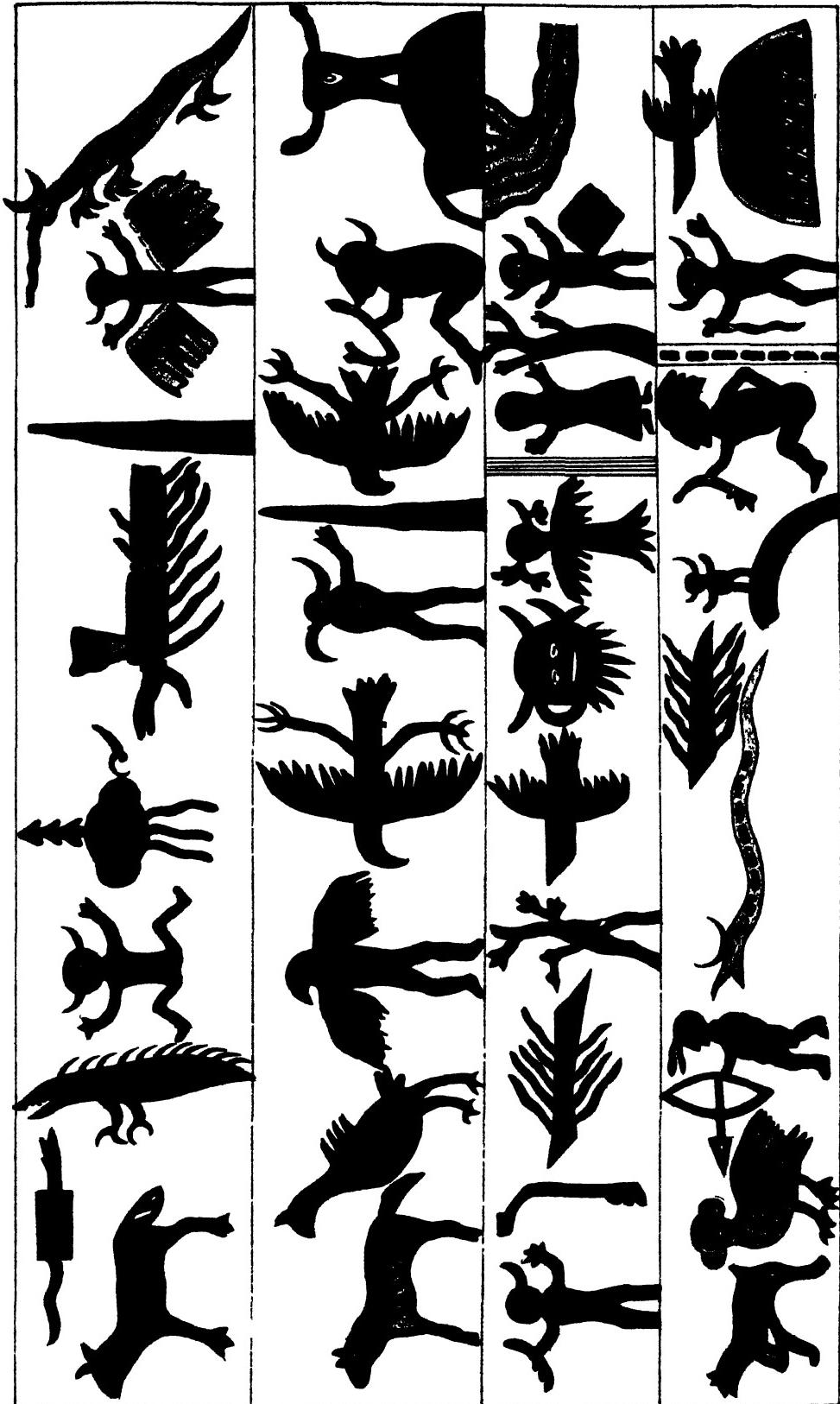
The primitive home of the Siouan stock (characteristic Plains Indians since the introduction of the horse) was eastward in the region of the Carolinas. This fact has been revealed by the study of the Tutelo and Catawba languages belonging to this eastern area, and by inspection of the traditions of the various Siouan tribes. The main bodies of Siouan migrants followed the Ohio and the Missouri far to the north and west; the Mandans, Assiniboins, etc., reaching to within the borders of Canada. Other minor bodies traveled to the southwest, their representatives still existing in the Biloxi, etc., of southeastern Mississippi. The Siouan tribes seem to have followed the buffalo in its retreat westward, and their migration from the Carolinas is of considerable sociological interest. At one time their trans-Mississippi habitat included practically all the territory between the Arkansas and the Saskatchewan from the great river to mid-Montana, with the Winnebagoes jutting out on Lake Michigan. Their forays and trade-excursions led some of them from time to time across the Rocky Mountains—the present writer, in 1891, met a friendly party of them far within the Kootenay territory.

The original habitat of the Shoshonean or Uto-Aztecán stock, which embraces the Ute, the Sonoran, and the Aztecán (Nahuatl) peoples, and has representatives from the north of Idaho to the Isthmus of Panama, was probably somewhere in the northwestern section of the United States. The primitive home of the Shoshonean section was "somewhere between the Rocky Mountains and the Great Lakes," and the traditions of the other two branches bring them from the far north, as compared with their present southern abode.

The Mayan stock, creators of the civilization of Central America, according to their own traditions, came from somewhere to the north—the position of the Huastecan branch of this stock north of Vera Cruz suggests that the Mayan emigrants from the home-land skirted along the Gulf of Mexico from some region considerably to the north.

The Arawakan stock (including the natives of the Bahamas and the Antilles, except the intrusive Caribs) had an extension in South America comparable only to that of the Algonkians and Athapascans in the northern half of the continent,—from the high Paraguay to the Goajiran peninsula in Venezuela, and in its greatest expansion from the Xingú to the Amazon and Orinoco. Its primitive habitat was in some part of the Brazilian interior, probably between the Xingú and the Paraguay, the general trend of their migrations having been northward. The Cariban stock, another very extensive people, who at the time of the Colombian

PICTURE WRITING OF THE OJIBWAY INDIANS.



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discovery were to be found in the smaller West Indian islands, and the northern part of the continent from the Essequibo in Guiana to about the Isthmus of Panama, came originally, as the presence of the Carib Bakairi on the Xingu indicates, from the high interior of Brazil, at the sources of the Xingu and Tapajos.

The Tupian stock were widely extended at the time of the discovery along the Atlantic coast region from the La Plata to the Amazon, with branches scattered along the Paraguay and the Madeira to the foot of the Andes. Their primitive home, Brinton, with reason, assumes to have been in the central highland country to the east of Bolivia. The general direction of the earliest migrations of this stock was therefore southward (down the Paraguay to the Atlantic), after which the Tupi branch followed the coast to the Amazon. The Tapuyan stock, who once occupied the region between the Xingu and the Atlantic coast (from the latter they have been driven by the Tupis), are probably the oldest human residents of part of this area, their tenure of the seacoast reaching far back into prehistoric times.

The Chibchan stock, to which was due the civilization of the Bogota region of Colombia, had their original habitat in the Andean highlands of central or southern Colombia, whence they wandered northwest into the Isthmus of Panama and northeastward up the Magdalena.

The Quechuan stock, authors of the most remarkable of South American civilizations, according to their own traditions spread from very small beginnings in the country about Lake Titicaca; but von Tschudi and Brinton, for linguistic reasons chiefly, find the primitive home of this people to have been in the extreme northwest of their characteristic area. The Aymara stock, which some authorities consider to have been a branch of, or perhaps an older member of the Quechuan, had its original habitat to the southeast of the latter. The relation of the Aymaran stock to that which produced the Calchaqui civilization of the northern Argentine is not clear.

Language and Writing.—Although the languages of the American aborigines constitute so many independent families of speech, the vocabularies of which are entirely divergent one from another, nearly all (if not all) of them possess certain general grammatical characteristics which justify us in classing them together as one great group of human tongues. Brinton enumerates as points of resemblance: Development of pronominal forms, fondness for generic particles and for verbs over nouns, and incorporation,—the inclusion of subject or object (or both) in the verb, etc. Most American Indian tongues may be called "holophrastic," from the practice of compressing a whole "sentence" into a "word," the length of which is sometimes very remarkable. As an example may be cited the Micmac (Algonkian) *yáleolemáktawcpokwóse*, "I am walking about carrying a beautiful black umbrella over my head." This word, according to Rand, is derived from *pokwósón*, "an umbrella"; *máktawde*, "I am black"; *wolæe*, "I am beautiful"; *yále*, "I walk about." From the Kootenay language may be cited: *Nátlámkiné*, "he carries the head in his hand" (*n*, verbal particle; *atl*, "to carry"; *tlám*, composition form of *aaktlám*, "head"; *hin*, "to do anything with

the hand"); *iné*, verbal); *hinúpqañapiné*, "thou seest me" (*hin*, "thou," (subject pronoun); *upqa*, "to see"; *dp*, "me" (object pronoun); *iné*, verbal). As typical incorporative languages the Iroquoian and Eskimo may serve. All the incorporate forms of speech in America do not, however, proceed upon identical lines; and some that do incorporate, like Kootenay and Eskimo, often have one or more cases. According to Dixon and Kroeber many Californian languages do not possess the feature of incorporation at all (such are, for example, Maidu, Pomo, Yuki, etc.). As types of incorporating languages less complete than Iroquoian we have Kootenay, Siouan, Aztec. Some of the Central and South American tongues seem also to have little incorporation. Otomi and Maya appear to be evolving in somewhat the same direction as modern English, away from incorporation and grammatical plethora. Many of the Amerindian tongues are both prefix and suffix languages; others prefer prefixes, others, again, suffixes. Some possess, and some do not, a plural form for nouns; a dual; gender-distinction in pronouns; a high development of demonstratives; reduplication; syntactical cases, etc. A few possess grammatical gender and some exhibit differences in the words used by men and women. In the matter of phonetics the languages of the American aborigines are remarkably divergent, some being extremely harsh, guttural and consonantic, others equally smooth, soft, and vocalic. The absence of certain consonant sounds and the equivalence of certain vowels and consonants characterize some forms of American speech. Euphonic changes are of major or minor importance. Sentence-construction differs greatly in various tongues. The position of the adjective is not always the same. The Haida language has even a distinction like that between our *shall* and *will*. Careful investigation of the many Indian languages, as yet studied imperfectly, if at all, may reveal other interesting linguistic phenomena. How much has been written about and in some of the languages of primitive America may be seen from the bibliographies of Pilling! Our knowledge of them varits from a brief vocabulary of the Esselenian to the exhaustive dictionary of Yahgan compiled by Bridges. The native literature runs from the unrecorded tales of the northernmost Athapascans to the poetry of the ancient Mexicans and Peruvians, some of which has been handed down from pre-Columbian times. The only actually phonetic (syllabic) alphabet now in use among the Indians (except the syllabaries introduced by missionaries among the Athapascans, Crees, etc.) is post-Columbian,—the invention of a half-blood Cherokee. A sort of alphabet has, however, sprung up more recently among the Winnebagos. The development of picture-writing varied very much among the numerous tribes, as may be seen from Mallery's classic study of the subject. Sometimes, as is the case with the Kootenays, ability to draw does not seem to have been accompanied by exuberant pictography. The Walum Olum of the Delawares, the "calendars" of the Kiowa, Sioux, Pima, etc., are special developments of primitive records, the highest form of which is seen in the manuscripts ("books") of the Aztecs and Mayas of a religio-historical character. The pictographic records of the Ojibwa "medicine men" have been studied by

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Hoffman, and the rite-literature of the Cherokee by James Mooney. The native literature of primitive America has been the subject of special monographs by Dr. D. G. Brinton. The Spanish-American countries have furnished several writers and investigators of Indian descent.

Religion.—The mythology and religion of the American Indians have received particular treatment at the hands of Müller, Brinton, Powell, etc. Perhaps the most general myth of importance is that of the divine hero, teacher, and civilizer, who after accomplishing his labors, leaves the earth, promising to return at some future time. This myth is found in Mexico (Quetzalcoatl), Yucatan (Kukulkan), Colombia (Bochica), northeast North America (Manabozho, Glus-kap, etc.) Somewhat analogous is the myth of the twin reformers of the primitive world among the Pueblo Indians, Navahos, etc. The Iroquoian stock have the myth of the contest of the good and the bad mind. The Algonkians have a myth-cycle of the rabbit, the tribes of the northwest Pacific coast one of the raven and thunder-bird, the Rocky Mountain peoples one of the coyote, the Brazilian Indians one of the jaguar, etc. Some of the tribes are very rich in animal myths and, as Mr. Mooney asserts, the characteristic tales of "an 'Uncle Remus' nature" found among the Cherokee and other peoples have not, as many suppose, been borrowed from the negroes of the South. Even the famous "tar-baby" tales have their independent Amerindian analogues. Flood-legends are widespread in America and vary from the simple, locally colored stories of rude Athapascans to the elaborate conceptions of the civilized peoples of Mexico, Central America, etc. The cardinal points and the number four have developed with many tribes a rich symbolism, with which the chief colors are often connected.

The "medicine men" of the Ojibwa, the Cherokee, the Apache, have been investigated by Hoffman, Mooney, and Bourke, and a large amount of accurate and authentic information concerning shamanism among the Amerindian peoples has been accumulated. The power of the "medicine man" varies much from tribe to tribe,—with some he is a personage of little or no importance; with others he is the controlling influence in secular as well as in religious affairs. The acme of such influence is found among some of the tribes of Guiana and Brazil. These "medicine men" had often their secret societies and "lodges" into which chosen neophytes were admitted with appropriate ceremonies. They had also, with many tribes, the control of the rites to which the youth were subjected at the time of puberty, with others they performed such marriage ceremony as existed. Besides these shamans, there were "prophets" and religious reformers, especially since contact with the whites. The widespread "Ghost Dance," in its more recent outbreaks, has been studied in detail by Mooney. Worthy of note is also the "new religion" of the Iroquois, and the "Shaker" religion of the Indians of Puget Sound. The investigations among the Pawnee by Miss Fletcher and G. A. Dorsey have demonstrated the existence of a relatively high form of primitive religion in a rather unexpected quarter,—their worship of the morning star in connection with agriculture was, however, at one time accompanied by human sacrifice. The mortuary rites of the American Indians, corresponding to

diverse ideas of the soul and its future in the other world, varied from simple neglect of the corpse to what is represented in material form by some of the mounds of the Mississippi Valley and the stone tombs of Peru. The mortuary customs of the aborigines of North America have been made the subject of a special monograph by Dr. Yarrow, and the doctrine of "animism" among the South American peoples has been treated at length by Koch. The contemplation of the *totem* (properly Ojibwa *odewma*)—tribal or family mark,—of certain Algonkian tribes has given rise to theories of "totemism," concerning which there is much dispute in the world of science. "Fetishism," as exemplified in the Zuñis, has been investigated with some detail by Cushing. Cannibalism (the word *cannibal* is the corrupted form of a South American tribal name) has been rarer in America than is generally believed. Outside of its occurrence through necessity in ways known to civilized peoples, it was chiefly partial and ceremonial. Epicurean cannibalism flourished along the coast of South America and on some of the Caribbean islands; ritual cannibalism among certain tribes of the northwest Pacific coast, in ancient Mexico, etc. The almost extinct Tonkaways of Texas have the reputation of being the "last of the cannibals," while the Attacapas owe their name to this practice attributed to them by their neighbors. In the legends of the Cree and Ojibwa tribes of the Algonkian stock, a cannibal giant (wendigo) figures, and a horror of human flesh eating is expressed at the present time, whatever may have been the case in the past. From the condition of human bones and other remains in the shell-heaps of various parts of the coast, some authorities have come to the conclusion that cannibalism did exist in prehistoric ages among some of the Indian tribes. Religious ideas approximating to monotheism are attributed by some chroniclers and investigators to some of the more enlightened aboriginal rulers of Mexico and Peru. In these regions of the continent, as also in Central America, architecture and the arts of commemoration and record were at the service of religion. See *MYTHOLOGY*.

Amusements.—The games of the American aborigines, some of which, like lacrosse, have passed over to their conquerors, are of sociological and religious significance in many instances. Stewart Culin has made a special study of the games of the North American Indians, and rejects the theory favored by Tylor and others, that many of them (for example, Mexican *patollis*), are imports from Asia. The games of the civilized Aztecs seem to be but "higher developments of those of the wilder tribes," and those of the Eskimo are modifications of games found among other aboriginal peoples of America. Among characteristic Amerindian games may be mentioned: The gambling game with sticks, the hoop-and-pole game, the ball-race of the southwestern United States, the ball-games of eastern North America, the woman's game of double ball, foot-races, the snow-snake, etc. Culin holds that back of every game lurks "a ceremony in which the game was once a significant part." The variations in games do not follow linguistic lines. One centre whence games have radiated and where some of their oldest forms are still to be found, is in the southwestern United States, from which their migrations can



STONY INDIANS WEARING RICH OTTER AND ERMINE TROPHIES.

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be traced north, northeast, east, and south. Interesting modifications arise from conditions of environment.

Arts and Inventions.—The arts and inventions of the American Indians correspond to the extent and variety of their environment. The mass of the inhabitants of the continent at the time of its discovery were hunters and fishers, or agriculturists of the Stone Age, most of whom had some knowledge of pottery-making. The house followed the lines of climate and culture, from the snow *iglus* of the Eskimo and the rude *wickiups* of the Utes to communal houses of the Mohegans, the Iroquian "long-house," phalansteries of the Pueblan and Central American areas, and the stone dwellings of a more or less pretentious sort of the civilized peoples of Mexico, Central America, and Peru. The cavate lodges and cliff-dwellings of Arizona and New Mexico, the wooden (sometimes underground) houses of the northwest Pacific coast, the skin-tents of the plains tribes and the wigwams of the Algonkians, the earth-lodges of the Mandans, etc., correspond to environmental stimuli. A like variation may be seen in the cradles of the American aborigines, studied by Mason, and in their means of transport on the water,—kayaks, "bull-boats," woodskins and balsas, dug-outs, canoes of pine and birch bark, large and small, and of all varieties of design and finish. In North America the Algonkians and Iroquois, and in South America the Indians of the great Brazilian water-ways, have made themselves celebrated for their skill in navigation. So too has the Eskimo with his kayak and the Peruvian with his balsa. The Algonkian Etchemins are literally "the canoe-men." The seagoing canoes of the fishing tribes of the coast of Alaska and British Columbia also deserve mention. On land some of the American Indian tribes have used the dog (Eskimo in particular) and the sled (the Algonkian toboggan, adopted by the whites for amusement purposes, is a special form), while in Peru the llama has been employed for ages for "packing," but not for draft purposes. The use of the horse and the modifications of primitive culture thereby induced in the Indians of the plains of the Missouri-Mississippi valley, the llanos of Venezuela, the pampas of the Argentine, etc., are, of course, post-Columbian. So, too, the influence of sheep culture upon the Navaho and their primitive industries, and of the cow among certain South American tribes. The only animals domesticated by the Indians whose use amounted to a considerable factor in their social and religious life were the dog and the llama, the latter in Peru and Bolivia only. The other half-domesticated animals and birds are of little importance as culture elements. The domesticated dogs of pre-Columbian America represent several diverse species of *Canidae*. The absence of such domesticated animals as the cow, the horse, the sheep, etc., in pre-Columbian America accounts for certain limitations of its culture as compared with that of the Old World. Pets, however, bird and beast, were very common, specially in Brazil and Guiana. The disappearance of the wild buffalo and other animals of the chase, since the coming of the whites, has been fateful for some tribes,—the contact with the latter as represented by the various "fur companies," etc., has caused many changes in the life of the aborigines, seldom for the better.

As Mason has pointed out, the Amerindian traps and other devices for the capture of wild animals indicate intellectual skill and marvelous adaptation to the habits and actions of these creatures. The Eskimo harpoon and its appurtenances, the simple and composite bow, the arrow-poisons of some North American and many South American peoples, the manufactures of obsidian and jade in ancient Mexico, cotton weaving and dyeing in the more southern regions, maguey-paper making in Mexico and Central America, stone carving (from Mexico to the Argentine), feather-work (in the southern United States, Mexico, Central America, and parts of South America), gold working (in the Isthmian region, Colombia, etc.), the hammocks of the Venezuelan tribes, the fish-poisoning devices of many peoples of South America in particular, the fine pottery of many regions of the continent, the *quipus* or knotted record-strings of the ancient Peruvians, the primitive drum-telephone of certain Brazilian Indians, the blow-gun (southeast United States and South America), cassava preparation (northern South America), the bolas of the Pampean tribes, etc., represent the diversity of invention and manufacturing skill among the American aborigines. The lamp of the Eskimo and some of the Indian tribes of northwestern North America is *sui generis* (its importance has been emphasized by Hough). Methods of computing time, season, etc., vary from the slanting stick of the Algonkian Naskopi to the elaborate calendar systems of Mexico and Central America. Of musical instruments, the drum, the flute, the pan-pipe, and the "musical bow" were known to the American Indians. Songs and dances to the accompaniment of these were in vogue. Practically all stages of primitive culture were to be found in pre-Columbian America, if we may judge from the tribes now surviving, from the savage Seris to the ancient Mexicans, Mayas, and Peruvians. Moreover, within the bounds of the same linguistic stock, as noted above, there may be found tribes representing a high and a low stage of development; as for example, the Aztecs and the Utes of the Shoshonean stock, the Dogribes and the Navahos of the Athapascans, etc. Some tribes were pre-eminently fishers, others hunters. Many excelled in both, like the Eskimo and some of the peoples of the northwest Pacific coast. Some sort of agriculture was widespread in America—the cultivation of corn, beans, varieties of pumpkin and squash, etc., was known all over eastern North America, and the regions of the southwest, etc.; and typical tropical and semi-tropical and other plants and fruits (potato, tomato, maize, pineapple, tobacco, varieties of cotton, manioc, sweet-potato, cacao, coca, etc.) were cultivated in the more southern regions of Mexico, Central and South America. The spread of tobacco and maize in North America and of certain other plants in Central and South America indicates agricultural receptiveness on the part of the many tribes concerned. The capacity of the American Indians generally for agriculture has been underrated probably, as both the desert-born cultivation of the Pueblos Indians and the tropically stimulated cultivation of the Indians of South America indicate. The arid regions of the Peruvian coast offer another example of considerably developed agriculture. In America the utilization of the gifts of earth varied from

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the seed picking and root digging of the Utes to the market gardens and chinampas of ancient Mexico. How the necessities of agriculture can shape a religious system may be seen from the rites and ceremonies of the Pueblos Indians, the cult of "mother corn," etc. With some tribes tobacco was more or less of a sacred plant, also the mescal.

Position of Woman.—The relation of women to agriculture gave them a higher standing with certain tribes than would otherwise have been the case. With the Iroquois the position of women was very high and to them was allotted a considerable share in the government, peace negotiations, etc., and female chiefs were by no means unknown,—women were the "mothers of the nation." Among the Mayan peoples of Central America woman's position was also high. Many of the priests were women, and they were also commonly the leaders of their tribes in rebellion against the Spaniards—the most famous was Maria Candelaria, "the American Joan of Arc," who led the insurgent Tzendals in the 18th century. In ancient Mexico and Peru the position of woman was perhaps not quite so high. Among some tribes the position of woman was very low, and her sexual peculiarities added to the disesteem in which she was held, as for example, among the Tacanan Araunas of Bolivia. The Athapascans tribes vary much in their treatment of woman,—with some she is little better than a slave or servant, while with at least one Alaskan people of this stock female chiefs existed at times. The "purification" of women at the period of their menses, and the segregation of girls at the time of puberty, were accompanied with many rites and ceremonies among various tribes from the rude Athapascans to the civilized Aztecs. The curious custom of the *cowade* (imitative child-bed on the part of the husband) prevailed among many Venezuelan, Guianian, and Brazilian peoples. The relations between environment and the share of the sexes in culture has been investigated by Mason; according to whom the zenith of virile Amerindian art is reached in Peru, while in Colombia we find woman as farmer, weaver, and potter. In the Oregon-California region one art, basket-making, reaches its acme of development in the hands of woman. A large female influence in religion is noticeable among the Pueblos Indians. Among some tribes, for example, the Hurons, the wergild for killing a woman was greater than that for a man. Some sort of matriarchal system, with maternal descent, prevailed very commonly in pre-Columbian America; among certain of the Koloschan Indians, for example, a man was considered to be in no sense related to his father, his sole parent being the mother. Besides this extreme form, numerous other varieties occur among the tribes now existing, the system in vogue among the Iroquois, etc., being more complicated and adapted to social needs. The systems of marriage known to the American Indians varied from the absence of any particular rite or ceremony to selection of the wife by the old women of the tribe, as among the Hurons, or the uniting of the couple by the "medicine men." Some of the tribes of the Brazilian forests, ranking very low in culture, are strictly monogamous; while peoples of higher civilization, like the Chibchans, Mexicans, Peruvians, etc., were polygamous or concubinative, or both. Marriage

by purchase was found over a large area of America; but here as in other parts of the globe, the "money" received was often rather a compensation to the parents for the loss of their daughter than a real sale of her to a suitor. Divorce, in many forms, is known to the primitive Americans, both by mere word of the husband and according to set forms and rites. Consanguineous marriages were strictly avoided by many tribes; but among a few, such as some of the lowest Athapascans, incest was not condemned. In the matter of the sex-relations, as in many other fields, the American Indians exhibit almost all possible phases from the monogamic chastity of some of the lowest peoples to the unnatural indulgences of the Peruvians. Runaway matches and marriages for love, in spite of the contrary opinion entertained by some authorities, have been by no means uncommon throughout the continent. Suicide on account of unsuccessful wooing by both sexes is also not at all rare. Some peoples, too, have developed love-songs of a romantic order, for example, the *yaraveys* of the Quechuas.

Government.—The systems of government of the American Indians and their tribal organizations range from the simple democracy of the Kootenays and some of the Brazilian Indians to the elaborate state institutions of the ancient Mexicans and Peruvians, which in several respects resembled the corresponding institutions of mediæval Europe or the ancient classic world. The power of the chief, however, seems everywhere to have had limitations, and some tribes distinguished the permanent peace chief and the temporary war-chief. Chiefs were generally elected, either from the body of the tribe or from certain specified families. "Totemism" and secret societies are not found to any extent, if at all, among certain tribes (the Kootenay, for example); while with many of the peoples of the northwest Pacific coast they are perhaps the chief feature of aboriginal society, as Boas has recently shown. Property rights are represented in many stages, from the semi-anarchic Eskimo to the Aztecs of Old Mexico and other peoples of Central and South America. Slavery existed among many tribes, and on the northwest Pacific coast a sort of traffic in human chattels had arisen. See *SLAVERY*.

Trade and Commerce.—Within the spheres of the culture-centres of Mexico, Central America, Peru, etc., trade and commerce were well developed. The Columbia River region was the scene of a less developed trade; while the southeastern United States, the region of the Great Lakes and country west and south of them, had also their important distributing points. The region of Bering Strait was likewise an Asiatic-American commercial centre.

Education.—With the lower tribes generally, such education as was imparted to the children was given by the father to the boys and by the mother to the girls. Peoples like the Iroquois, the Siouan Omahas, etc., used the instruction of tales, legends, and proverbs. The ancient Aztecs and some of the other semi-civilized peoples of Mexico and Central America had schools for boys and others for girls, in which the duties proper to each sex were taught under the supervision of the priests.

Physical Characteristics.—The physical characteristics of the aborigines of America mingle uniformity with diversity. The skin color, popu-

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larly styled "red" or "copper," is designated by Mantegazza, "burnt coffee," and by Brinton "brown of various shades, with an undertone of red." This but varies from rather dark to rather light. Among the lighter tribes have been reckoned the Koloschan Tlinkit, the Bolivian Yurucari, etc., and among the darker the Charmas of the Gran Chaco, the Bolivian Canisianas, and a few other tribes of South and Central America. The hair is generally termed "black," but, as Brinton notes, there is in it "a faint under-color of red," which shows up more in childhood and seems much more prominent with certain tribes than with others. Red hair is known among American Indians, but in some cases (certain South American tribes, for example), its occurrence may be due to infusion of white blood. The eyes of the Indians are, with rare exceptions, dark brown. The stature varies from rather low to rather high, represented on the one hand by some of the shorter Brazilian tribes and on the other by the Patagonian "giants." Among the peoples presenting many individuals of tall stature, may be mentioned the Yumas and Pimas, some of the Muskhogeans, some of the Crees, Ojibwa and eastern Algonkians, Pawnees, Iroquois, Siouans, Huaveans, Ramas, some of the Cariban tribes, Yurucari, Cayubabas, Guaycuruans, Patagonians, etc. So far as is known no dwarfish people comparable to the dwarf races of the Old World existed in America, although the skeletons from certain Peruvian tombs prove the existence of a dwarfish element in the general population; and the stature of many individuals among certain Brazilian tribes is so low as to induce some authorities, with Kollmann, to predicate the former existence of a dwarf race. In the relations of trunk and limbs and in the relation of one limb to another many variations occur among the Indians, due to occupation (canoeing, etc.,—and, since the advent of the whites, horse-riding). In primitive America all the chief forms of skull (often with artificial flattening, etc.) are found. Among the dolichocephalic (long-headed) peoples are the Eskimos and Iroquois generally, some of the Muskhogeans, Otomis, Aymaras (partly), Tapuyas, and Tupis (largely), etc. Of the brachycephalic (broad-headed) may be mentioned the Araucanians, Caribs, Arawaks, Patagonians, Mayas, many of the tribes of the Pacific coast region of North America, etc. The civilized peoples of Mexico, Central America, and Peru appear to have been of stature below the average and of varied skull form tending to brachycephalic, indicating mixtures of types. In the Columbia River region type-mingling is indicated also by both stature and skull-form. The Peruvian region is another centre of race-mixture, as evidenced by skull-form. The oldest skulls discovered in prehistoric burial-places or in geological *situ* are not distinct from the American types,—the latest found, the "Lansing skull," is quite Indian. The skull capacity of the Indian is below that of the white in general, but many exceptions occur. The brains of the less cultured Indian peoples (Fuegians, Eskimos), show no decided anatomical inferiority to those of civilized Europeans. Great varieties of build and set of body are found among the American Indians, from the half-starved Fuegians to the well-fed and corpulent Iroquois. Small feet and hands are very common. Among many tribes

in various parts of the continent handsome men and women of considerable beauty are to be found. In the case of women an admixture of white blood often enhances their beauty.

Race-Fusion.—The intermingling of the American Indians with the intruding white race has been much greater than is generally believed. The extent of this fusion of races varies from certain parts of North America with their classic Pocahontas examples to Uruguay, in South America, where 90 per cent of the population are said to be of mixed blood. The Eskimos of Greenland have intermarried with the whites (Danish fathers, native mothers), so that except in the parts remote from settlements no pure-blood Eskimo exists; and the same is true of a good deal of Labrador, where the contact has been with fishermen of English descent. The Micmac, Abnaki, and related Algonkian tribes of Maine, New Brunswick, etc., have a large admixture of white blood (French fathers, native mothers), and all over Canada and the northwestern United States in the early days of colonization and exploration the French traders, trappers, *voyageurs*, and *courreurs des bois* mingled freely with the native women, particularly those of the various Algonkian peoples of the Great Lakes and the West. The Hudson's Bay Company, by introducing employees of English and Scotch descent into the Canadian Northwest, made possible other *métis*, of which those of Scotch descent on the father's side are said to be healthy and sturdy specimens of humanity, with more than ordinary capacities. As indicated by the present condition of the Iroquois on the reservations in Quebec, Ontario, and New York, some infusion of white blood has taken place from very early times. Here the combination of white mother (often an adopted captive) and native father is more common than is usual in race-mixture. The Cherokee had an admixture of white blood in ante-Revolutionary days, to which Mooney attributes much of their culture-achievement since that time. In Mexico, Central America, and South America generally, as Talcott Williams has very recently noted, the half-breed element is very large indeed, for the native population was never exterminated by the whites as some histories still teach. Of the 40,000,000 inhabitants of South America it has been estimated that less than 10,000,000 can lay any claim to pure white blood. There is reason to believe that the future of some of the South American countries will be as much in the hands of the Indians as in those of the whites. In Mexico, parts of Central America, Colombia, Peru, and Chile, the strain of Indian blood represents able and intellectual aboriginal peoples. In certain parts of South America, and sporadically in northeastern North America, intermingling of Indians and negroes has occurred, giving rise to the so-called *Cafusos*, etc., of Brazil, and a few other small groups. The mixture of white-Indian-negro is also found here and there. In some of the Spanish-American countries there is a special vocabulary to designate the numerous degrees of *métissage*. In the Canadian Northwest the half-breeds have taken a prominent part in the development of the country (one noted *métis*, Norquay, was premier of the province of Manitoba), and they are likewise noteworthy in the annals of the northwestern United States. In Mexico and Central America, not alone the *métis* but

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the Indians themselves have produced celebrated men. Juarez, the liberator of Mexico, a really great man, was a full-blood Zapotec, and President Barrios of Guatemala a Cakchiquel (Mayan stock).

Treatment by Whites.—The ill treatment of the American Indian by the whites has often been such as to stamp with eternal dishonor the conquering race. Massacres, broken treaties, land-robbing, commercial swindles, etc., mark the path of advancing "civilization,"—English, Dutch, French, Portuguese, and Spanish have all been guilty at some time or other. The English in Newfoundland, the Americans in the West, the Castilians in northern Mexico and Yucatan, have exterminated or sought to exterminate whole tribes. We must, however, believe that the accounts of the early chroniclers concerning the "millions" of Indians slaughtered by the Spaniards, were the customary exaggerations of those who sing the victor's deeds. Peru and Mexico, for example, would not contain so many Indians to-day were those stories literally true. Against the centuries of dishonor in the treatment of the Indians by the whites, we may place the efforts of missionaries of all faiths, from the good Las Casas in New Spain to Duncan of Metlakahtla. The Jesuits among the Iroquois and Algonkians in North America, the Moravians among the Eskimo and some of the Algonkians and Iroquois, have all done good work, which only the incapacity or worse of governmental authorities has made null. The missions in California and the "reductions" in various parts of South America (Paraguay in particular) might have succeeded in keeping the Indians gentle and loyal sons of the Church had the good fathers been forever in charge, but the oncome of the more strenuous life of the whites doomed them to helplessness. The story of the Paraguayan experiment is one of the most interesting in the annals of mankind, but also one of the most disheartening. Against such failures a few bright spots may be set,—the Fuegian mission, for example; but even there all is not well. Signs of a better treatment of the Indians still within the borders of the United States are not wanting, and it is to be hoped that the present educational fads with which white children are being experimented upon will be kept far from the Indian schools.

Influence on Civilization.—The contributions of the aborigines of America to the world's stock of civilizing factors and influences are much more numerous and of greater importance than is generally thought. Besides the innumerable place-names in all parts of America of Indian origin, the Algonkian, Peruvian, Brazilian, West Indian, Guianian, Venezuelan, and Mexican words in English, French, Spanish, and Portuguese (whence many of them have spread into all the civilized languages of the world) are able remembrancers of the conquered race. The literature of the Spanish-American countries and of Brazil has been more or less affected by the stimuli of native theme and treatment. Many of the old dances and folk-customs still survive even where Christianity has been at least outwardly accepted and have sometimes been adopted by the descendants of the European colonists. The "Hiawatha" of Longfellow, and the tales and dramas based upon the deeds, adventures and romantic episodes in the lives of King Philip, Pocahontas, Pontiac, Tecumseh, etc., to

say nothing of the novels of Cooper and his successors, indicate that the Aryan mind of the Anglo-Saxon order has found treasure in the Amerindian soil. In Mexico and other parts of Spanish America the cathedrals and other religious edifices, by intention or by happy chance, often occupy sites sacred ages before the Columbian discovery to pagan deities,—so the new religion gathers strength from the old, and the dislocation of faith so common in Protestant countries is avoided to a very large extent. Of more material things, we owe largely to the Indian the paths over which our highways and our railroads run, while many of our cities and towns have only sprung up on the old campsites of our predecessors. The great importance of some of these "Indian ways" in the history of the United States has been pointed out by Hulbert. The Indians' knowledge of the great water-ways of the country, of portages and trails through forest and over mountain, has made possible colonization and settlement otherwise utterly out of the question. Indian hunters and fishers, scouts, guides, canoe-men, carriers and packers, in all sections of the American continent, have been indispensable to the progress of white civilization. Nor have Indian slaves and servants been few or without social significance in some quarters; while French, Spanish, and English have at times availed themselves of the services of Indian warriors,—the Iroquois enlisted for the North and some of the Cherokee for the South in the Civil War, and then the government has sometimes set one tribe off against another. In Canada and part of the northwest of the United States, where commingling of the races has taken place, the civilization of the land owes even more to the half-breed, *voyageur, courieur des bois*, etc., than to the Indian himself. (See CANADA.)

Throughout the continent—more especially, however, in parts of South America—devices for hunting and fishing and appliances in woodcraft, primitive agriculture, etc., were transferred to the European colonists during the period of settlement, and many of them are still in active use. Fish-poisoning by narcotics, the use of the blow-gun for killing birds and small animals without damaging the skin, methods of stalking beasts of the chase, certain traps and snares, etc., belong here. In connection with agriculture we have menhaden-manure, guano, etc., the planting of corn and beans or pumpkins together, the burning over of land before tillage, etc. But it is upon the food-supply of the world that the American Indian has exerted the greatest influence. Potatoes (common and sweet, both), maize, and the tomato, now in use by all the civilized world, were first cultivated by him and taken over by the whites after the discovery. Cacao, vanilla, jalap, the kidney bean, several varieties of squash and pumpkin, manioc, Jerusalem artichoke, coca, agave, quinoa, persimmon, and perhaps also the peanut, came to us from the Indians. Maple-sugar and maple-syrup, pemmican, jerked beef, etc., are from a like source. Tobacco, the great narcotic, was one of the first gifts of America to the Old World. Of drinks the American Indian has given us Paraguayan *mate*, "Labrador tea," and several other like concoctions, chocolate, Mexican *pulque*, and a considerable number of other intoxicating beverages from South America.

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Many medicines and medicinal plants were made known to the whites by the Indians, and in the era of settlement and colonization the "Indian doctor" (male and female) was not unimportant,— New England, for example, had its "Joe Pye," after whom the "Joe Pye weed" (*Eupatorium purpureum*) is named. The Californian Indians have furnished perhaps the three most important contributions of recent years to the American pharmacopœia. South America, besides numerous locally known remedies, etc., has furnished the world-famous *quinine*, and *specacuanha*, while the drugs *cocaine* and *curari* must ultimately be credited to the aborigines of America. Many dye-stuffs and dye-woods were first given to the civilized world by the Indians, both for domestic use and for employment in the larger world of aesthetic manufacture. These dyes range from the poke of northeast North America for dyeing basketry to the famous *roucou* or *anotto* of Venezuela, used, among other purposes, for staining cheese. Pottery and other household utensils of Indian manufacture are used throughout Spanish America. The hammock of the Arawak Indians belongs now to all civilized peoples. All that India rubber means, civilization owes to the Indian. Both in small things and in great the American aborigines, through their gifts to the white race, will long be remembered, even if, as some authorities (upon imperfect evidence) believe, they are rapidly passing away. On this point one may cite the remark of Deniker that Humboldt in 1825 estimated the total population of America at 13,000,000 whites, 6,000,000 half-breeds, 6,000,000 negroes, and 9,000,000 Indians, while a computation made in 1895 reckoned 80,000,000 whites, 37,000,000 half-breeds, 10,000,000 negroes and 10,000,000 Indians.

There might be mentioned here also the "Chinook Jargon" of the Columbia River region, the "Ligoa Geral" of Brazil, and the minor jargons and trade languages of other sections of the continent, which prove how the Indian has compelled the white man, more or less, to use his language in some form or other for the purposes of friendly or commercial intercourse.

Antiquity of Man in America.—The question of the antiquity of the American Indian culture is difficult to settle satisfactorily. Time must be allowed for the divergence of the original stock into the numerous (more numerous in pre-Columbian eras) tribes and peoples inhabiting America at the time of its discovery,—time for the production of the Eskimo and the Iroquois, the Carib and the Patagonian. Time, again, must be allowed for the development of the Aztec from the primitive Shoshonean, the Mayan from the rude stock of that people, the Chibchan from the savage Bolivian, the Peruvian from the ancient barbarian of equatorial America. Then the civilizations of Mexico, Central America, and South America as such probably took ages to rise and flourish. Town and village life, with all its social and religious implications, the differing architectural monuments of the various centres of American civilization, etc., did not spring up in a day, any more than did the culture of mediæval Europe. The domestication of the dog, the llama, etc., the change of maize, tobacco, the squash, the tomato, the potato, the pineapple, etc., from wild to cultivated plants, require a long lapse of time. Moreover, it is now known

that American Indian languages do not now change and have not in the past changed at the fast rate once assigned to them by philologists. So, while one may not believe that America was the original habitat of the human race, he may be certain that very many millenniums have elapsed since the "Red Man" began his career as the autochthon of the New World. There seems every reason to believe that at the close of the Glacial Age man had spread over a considerable portion of both North and South America, and was contemporary with European man of an early epoch. To calculate man's residence in the American environment by years is impossible on present evidence. Dr. Stoll assures us that the linguistic phenomena met with in the Mayan dialects alone require thousands of years for their evolution, and some of the results deduced from the Mayan hieroglyphs by certain investigators imply the existence of civilization of the Central American order for very many millenniums. Perhaps it is fair to say that man has been in America at least 25,000 years and not more than 200,000, and that the civilizations of Mexico, Central America, and South America were probably as long-lived as those of Rome, Greece, etc. They were also in many respects just as typical of human attempt and achievement, for the American Indian was a man as we are men.

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INDICATOR

Iroquoian, Muskogean, Salishan, Siouan, Wakashan; 'Publications of the Field Museum'; Ratzel, 'History of Mankind' (1898); 'Relations des Pères Jésuites' (1902); 'Reports of Ontario Archaeological Museum'; 'Reports of Committee of British Association on Northwestern Tribes of Canada'; 'Reports and Memoirs of Peabody Museum'; Von den Steinen, 'Durch Zentral-Brasilien' (1886); 'Unter den Naturvölkern Zentral-Brasilien' (1894); Schmidt, 'Die Vorgeschichte Nord-Amerikas' (1894); Thomas, 'American Archaeology' (1898); Tooker, 'Algonquian Series' (1901); Winsor, 'Aboriginal America' (1884-9).

The 'Publications of the Bureau of American Ethnology,' embracing original monographs by eminent specialists, are a lasting monument to the founder of the Bureau, the late Maj. J. W. Powell, to whom all students of the aborigines of the New World owe a debt of deepest gratitude. Among workers not connected with the Bureau, the death of D. G. Brinton in 1899 removed perhaps the most gifted and representative Americanist.

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Indicator, in steam engineering an instrument invented by James Watt, to record, graphically and automatically, the pressure in an engine cylinder at every point of the stroke. By means of the diagram that the indicator

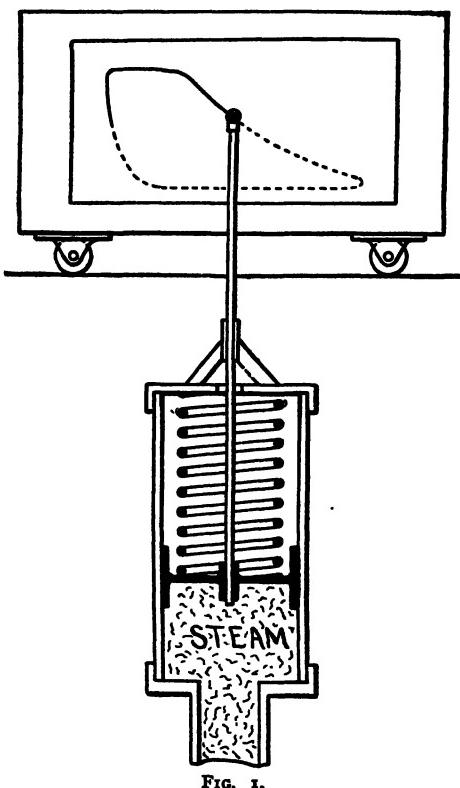


FIG. 1.

draws, it is possible to determine whether the valves of the engine are working correctly or not, and it is also possible to estimate the horsepower that the engine is developing, with con-

siderable accuracy. Commercially, the steam-engine indicator may be had in many forms; but all are based on the same fundamental principle, which will be understood by reference to the diagram presented in Fig. 1. The paper upon which the indicator diagram is to be drawn is here supposed to be secured, flat, to a carriage which travels back and forth upon a track; the motion of the carriage corresponding precisely

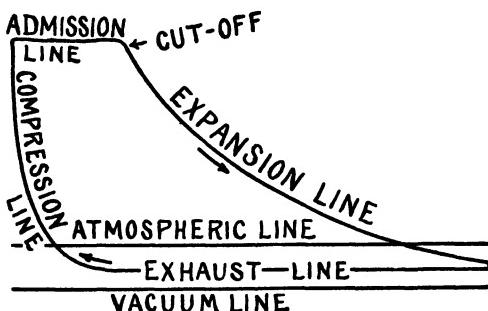


FIG. 2.

to the motion of the piston of the engine. In practice it would be inconvenient to have the carriage travel a distance equal to the whole stroke of the engine, and hence some form of reducing motion is used, so that the motion of the carriage may follow the motion of the engine piston accurately, but with materially reduced velocity. The indicator diagram is drawn by means of a pencil-point carried on the piston rod of a small steam cylinder which is situated below the carriage, and which opens freely into the cylinder of the engine from which the diagram is to be taken. The piston of the indicator is pressed downward by means of a spring whose strength is accurately known, so that the increase of pressure corresponding to a rise of one inch in the position of the pencil-point is known. When the indicator is in operation, the pencil rises and falls proportionately to the pressure of the steam in the engine cylinder, and the carriage, with its attached paper, travels back and forth, horizontally, at the same time, keeping pace precisely with the motion of the piston of the engine. Under these circumstances the pencil-point traces a diagram somewhat like that shown in the illustration. In practice, the paper upon which the diagram is drawn is usually wrapped about a cylindrical drum, which rotates back and forth as the instrument works, following the motion of the engine piston just as the carriage here shown is supposed to do. In Fig. 2 an enlarged view of an indicator card (or diagram) is given, together with the technical names of some of its more important parts. The arrows show the direction in which the pencil travels as the diagram is drawn. The "admission line" is the part that is drawn while the engine is in full communication with the boiler, and drawing steam from it. The angle marked "cut-off" corresponds to the moment at which the steam supply is cut off, and the expansion of the steam begins. The "expansion line" is drawn during the expansion of the steam, and on the return stroke, after the exhaust valve has opened, the "exhaust line" is drawn. When the exhaust valve has closed again, the steam remaining in the engine cylin-

INDICTMENT—INDIGO

der is compressed until the end of the stroke, the indicator meanwhile drawing the "compression line." The "atmospheric line" is the straight, horizontal line drawn by the engine when the connection is broken between the engine cylinder and the indicator cylinder, and the latter is open freely to the air. The "vacuum line" is the line that would be drawn by the instrument under like circumstances, if a perfect vacuum could be maintained in the indicator cylinder. The "vacuum line," of course, must be drawn in by hand. It is parallel to the "atmospheric line," and at a distance below it corresponding to a pressure of about 14.7 pounds per square inch, on the scale to which the diagram is drawn. The diagram shown in Fig. 2 refers to a condensing engine. In a non-condensing engine, the exhaust line would not be lower than the atmospheric line, and would, in fact, be above it, if there were any sensible back-pressure in the engine during exhaust.

For detailed information concerning the indicator and its uses, consult: Pray, 'Twenty Years with the Indicator'; Peabody, 'The Steam Engine Indicator'; also, for less extended treatment, any good book on steam engineering.

Indictment, *in-dit'mēnt*, a formal charge made before a legal tribunal against an accused person. The essential requisites of a valid indictment are,—first, that the indictment be presented to some court having jurisdiction of the offense stated therein; second, that it appear to have been found by the grand jury of the proper county or district; third, that the indictment be found a true bill, and signed by the foreman of the grand jury; fourth, that it be framed with sufficient certainty; for this purpose the charge must contain a certain description of the crime or misdemeanor of which the defendant is accused, and a statement of the facts by which it is constituted, so as to identify the accusation; fifth, the indictment must be in the English language, but if any document in a foreign language, as a libel, be necessarily introduced, it should be set out in the original tongue, and then translated showing its application, 6 Term. 162. The formal requisites of an indictment are, first, that the venue, which at common law should always be laid in the county where the offense has been committed, although the charge be in the nature transitory, as a battery. The venue is stated in the margin thus: "City and County of —, to wit." Second, the presentment, which must be in the present tense, and is ordinarily expressed in the following formula: "the grand inquest of the State of —, inquiring for the city and county aforesaid, upon their oaths and affirmations present." Third, the name and addition of the defendant; but in case an error has been made in this respect, it is cured by the plea of the defendant. Fourth, the names of third persons, when they must be necessarily mentioned in the indictment, should be stated with certainty to a common intent, so as sufficiently to inform the defendant who are his accusers. When, however, the names of third persons cannot be ascertained, it is sufficient in some cases, to state "a certain person or persons to the jurors aforesaid unknown." Fifth, the time when the offense was committed should, in general, be stated to be on a specific year and

day. In some offenses, as in perjury, the day must be precisely stated, but although it is necessary that a day certain should be laid in the indictment, yet in general the prosecutor may give evidence of an offense committed on any other day previous to the finding of the indictment. Sixth, the offense shall be properly described. This is done by stating the substantial circumstances necessary to show the nature of the crime, and next the formal allegations and terms of art required. As to the substantial circumstances: the whole of the facts of the case necessary to make it appear judicially to the court that the indictors have gone upon sufficient premises, should be set forth; but there should be no unnecessary matter, nor anything which on its face makes the indictment repugnant, inconsistent, or absurd.

According to the rules of pleading in criminal actions at common law there are certain terms of art used, so appropriated by the law to express the precise idea which it entertains of the offense, that no other terms, however synonymous they may seem, are capable of filling the same office; such, for example, as traitorously in treason; feloniously in felony; burglariously in burglary; maim in mayhem, etc. In New York, and in nearly all of the States which have adopted the code system, the common law rules of pleading in criminal actions have either been greatly relaxed or entirely abolished. Many of the statutes of the subject are similar to the New York statute, Code Crim. Pro. § 273, which in substance provides that all common law rules of pleading are abolished, and the forms of pleading prescribed by the code shall be substituted, and § 275 of the same code provides that all an indictment must contain is, the title of the section, specifying the name of the court to which the indictment is presented, and the names of the parties, and a plain and concise statement of the act constituting the crime, without unnecessary repetition. It is also provided in § 283 of the New York Code Crim. Pro. that words used in a statute to define a crime need not be strictly pursued in the indictment; but other words conveying the same meaning may be used.

Indigestion. See DYSPEPSIA.

Indigo, the name of a genus of plants, and of the blue coloring matter obtained from them. The indigo plants are tall herbs of the pea family, forming the genus *Indigofera*, of which there are several color-yielding species in various warm parts of the world. The one yielding the indigo of commerce, and formerly extensively cultivated, is *I. tinctorium*, which is native to India, grows five feet high, and has bipinnate leaves. The coloring matter most abounds in the leaves, and especially as the time of flowering occurs, and that is the time when the crop is gathered by cutting down the plant, and making immediate use of the green stems or foliage, or by drying them for subsequent treatment. This coloring matter is a chemical substance called *indican*, the glucoside of indoxyl, which is converted by oxidation into indigo. Until the discovery of the sea-route to India the only blue vegetable dye available in Europe was that derived from the woad (*q.v.*), which was limited and costly; this dye-substance was therefore regarded as one

INDIGO-BIRD — INDO-CHINA

of the most valuable of new commodities and a large capital was soon embarked in its cultivation in India, Ceylon, China, and other regions, where a profitable industry continued until after the middle of the 19th century. The indigo was obtained by macerating the leaves and stems in vats for several hours. Fermentation arises and the water becomes clear yellow. It is then run off into a lower basin, where it is subjected to incessant agitation and gradually turns green, whereupon the indigo begins to form in flakes and settle. The residuum is then thoroughly boiled, filtered through linen, molded into small cakes and dried. The best quality comes from Bengal and eastern India. Indigo plantations were made with more or less success in Brazil, Central America, and Mexico; and one of the foremost inducements held out to settlers in the southern colonies, from Maryland to Louisiana, was the probability of its successful cultivation there. The experiments never yielded results of much importance, partly because crops of tobacco, cotton, and food-stuffs were more profitable. Since the discovery of cheap methods of forming blue dyes from coal-tar the cultivation of indigo has declined greatly, but still supplies a steady demand from cloth-dyers who wish an imperishable blue of certain tints.

The wild indigo of the United States is any of several species of a closely related genus *Baptisia*, which flourishes especially in the Southern States. The best known is the yellow-flowered false indigo (*B. tinctoria*), or indigo brown, from which country people obtain a blue dye, and a domestic medicine.

Indigo Dyeing.—Before it can be employed in dyeing, the indigo must be brought into solution; and as indigo itself is insoluble, it must be first transformed into a soluble substance, so that it can penetrate the pores of the cloth, where it is subsequently again restored to the form of indigo. To bring the indigo into solution, it is ground up to a soft paste with water, after which it is thrown into vats along with ferrous sulphate, slacked lime, and water. The ferrous sulphate reacts with the lime to form calcium sulphate and ferrous oxid, the latter being immediately oxidized at the expense of part of the oxygen of the indigo, which in its turn is reduced to a substance called indigo-white. This dissolves in the presence of excess of lime, and the fabric to be dyed is dipped into the vat after the liquid in it is clear. On removing the fabric the indigo-white which has penetrated its pores is reoxidized by the air to indigo blue; and by repeating this treatment a shade of blue of any desired depth may be obtained. The dyed fabric is finally passed through dilute acid to remove any adhering lime or ferric oxid. Indigo appears to exist in the plant in the form of a glucoside known as "indican," which has the formula $C_{16}H_{10}N_2O_8$, and to be developed from this glucoside in the course of the fermentation by the action of a special bacillus, which closely resembles the bacillus of pneumonia. Indigo is now made artificially, the total production of synthetic indigo being probably about one fourth of the world's consumption. Although artificial indigo-blue appears to have the same chemical formula ($C_{16}H_{10}N_2O_8$) as the natural product, and to be identical with it in every way, it is more

expensive than the natural product at the present time. If it could be made more cheaply, it would work as great a revolution in dyeing as did the introduction of alizarin in the place of madder. (See COAL TAR COLORS, and the references there given.)

Indigo-bird, a numerous and beautiful North American finch (*Passerina cyanea*), the male of which is dark greenish blue, while the female is grayish brown. They are migratory, but in summer spread over most of the United States, placing their neat nest and unspotted bluish eggs in garden bushes as well as in wild thickets. The male has one of the brightest and most persistent songs of any American bird; and he is easily habituated to captivity.

Indigo-snake. The gopher-snake (q.v.).

In'direct Damages, claims for damages not directly inflicted by the illegal act complained of, but by other causes themselves due to that act. The great historical case is that of the United States claim for many hundreds of millions of dollars' worth of loss, resulting from Great Britain's bad faith or carelessness in letting the Alabama (q.v., and ALABAMA CLAIMS) escape from her ports to prey on our commerce. It was alleged that aside from the actual loss to our shipping and cargoes, we had been damaged to a far greater extent by the resultant effects, chiefly of three sorts: (1) The prolongation of the Civil War due to the encouragement given to the South and the straitening of the North. (2) The destruction of commercial lines and relations, which took long to recover after the War. (3) The raising of the rates of marine insurance. As these claims exceeded the cost of a war plus the indemnity we should have exacted if victorious, Great Britain refused to consider them; and the commission threw them out altogether as contrary to international law.

In'dium, the name given to a metal discovered by spectroscopic analysis in 1863. The zinc-blende of Freiburg was found by Reich and Richter, after a process of purification, to yield a substance the spectrum of which was different from all known spectra. They hence inferred the existence of a new element. This element has been isolated, but only in small quantities. It is of a silver white color, soft, and marks paper like lead; its specific gravity is 7.421 at 16.8° . The lead indium is related to cadmium and zinc, both of which occur associated with it in nature. The spectrum of indium exhibits two characteristic lines, one violet α and another blue line β ; besides these two fainter blue lines are visible if the burner in which the metal is volatilized be fed with hydrogen instead of coal gas.

Individ'u'alism is the name often applied to social systems founded on principles opposed to the essential principle of socialism, or to that theory of society which is opposed to state interference in industrial and economic and other relations. In its extreme form it is identical with one phase of anarchism. The word is also applied to social theories involving other and deeper views of individual rights than the mere non-interference referred to above.

Indo-China, the southeastern peninsula of Asia, formerly known as Farther India, including

INDO-EUROPEANS—INDUCTION

Anam, Burma, Cambodia, Cochin-China, French Indo-China, Tongking (qq.v.), and other districts.

Indo-European's, the Aryan race (q.v.). For accounts of the Indo-European languages see ARYAN; INDO-GERMANIC LANGUAGES.

Indo-Germanic Languages, the languages which are ancient and modern varieties of one primeval form of speech, anciently spoken in Central Asia. These languages are sometimes called the Indo-Celtic languages, the Japhetic languages, or more commonly, the Aryan languages. There are three forms of human speech, the monosyllabic, or isolating languages, such as the Chinese, whose words are unchangeable roots, each of which stands separately and is modified by the juxtaposition of other monosyllabic roots; the agglutinating languages, such as the South African, the Japanese, and the American Indian, in which, instead of being isolated, the roots are placed in close association, so as to agglutinate or agglomerate into one word. Some Eskimo words are as long as the longest compound epithet of Aristophanes. The third group are the inflectional languages. The Indo-Germanic languages are inflectional. In these the roots of all words are not necessarily modified, but they may be modified, in order to express certain relations, and the roots are also added to by suffixes and prefixes. The Indo-Germanic languages do not extend over so wide an area as the monosyllabic languages, but are spoken by the most civilized and intellectual peoples of the world. The Indic branches are the ancient Hindu languages, the principal of which is Sanskrit, and the modern Hindu languages. The Iranic or Persian branch includes, Zend, Old Persian, Armenian, Parsee, modern Persian and the dialect spoken by the mountaineers to the northwest of India. The great Hellenic branch was spoken anciently by the inhabitants of Greece, of the west coast of Asia Minor, of the islands of the Aegean, as well as of the south and southwestern coasts of Italy. It is spoken in a modified form in Greece and the Greek islands of to-day. Parallel to the Hellenic is the Italic branch, which includes the primitive Italic languages, Oscan, Etruscan, Umbrian, and Latin, as well as the classic Latin of Virgil and Cicero, which settled into the Italian of Dante and, on being extended over western Europe, grew through many modifications into French, Provençal, Italian, Spanish, Portuguese and Roumanian. Distinct from this branch was the Celtic, which survives to-day in the Welsh and Gaelic dialects. The Teutonic tongues include the Gothic of Ulfilas (4th century A.D.) the Norse languages, the Low German and the High German group. The Slavonic languages are spoken in Russia and Poland and include the Lithuanian and the Old Prussian. There are several other Indo-Germanic tongues and dialects which philologists have not been able to classify; such are the Etruscan in Europe and certain languages of Asia Minor. Compare: Schleicher, 'Compendium der vergleichenden Grammatik der Indo-Germanischen Sprachen' (1871); Corrsen, 'Ueber Aussprache, Vocalismus, und Betonung der lateinischen Sprache'; and most important Brugmann and Delbrück, 'Grundriss der vergleichenden Grammatik der Indo-Germanischen Sprachen' (1897 *et seq.*).

Induction. It is a familiar fact that an electrified (or magnetized) body causes electrical (or magnetic) disturbances in other bodies in its vicinity, when it is not in direct and visible connection with them, and the process by which these disturbances take place is called "induction." The ultimate mechanism of induction is still somewhat obscure, but something has been learned of its general nature. In the early days of physical science it was believed that bodies can act upon one another even across spaces that are absolutely void, and at the present time it is sometimes convenient to assume them to act in this manner, in forming mathematical equations for the treatment of physical problems. It is no longer believed, however, that this is what actually happens in nature; the phenomena of electric and magnetic induction being now attributed to motions or stresses in the ether which transmits light. (See ETHER.) Newton was of the opinion that induction is an ether-phenomenon, and in the first half of the 19th century Faraday may be said to have established the ether hypothesis upon a substantial experimental foundation. In later years Maxwell developed Faraday's conceptions mathematically, and added much more evidence that was partly theoretical and partly experimental; so that at the present time there are few or no physicists who doubt that induction is a manifestation of some form of activity in the light-bearing ether. Opinion is still divided, however, as to the precise nature of this activity. In fact, we cannot hope to gain any very precise information on this point until much more is known about the constitution of the ether itself.

The charging of a condenser is a phenomenon in electrostatic induction. If the condenser consists of two parallel plates (for example), of a given size and set at a constant distance from each other, and we charge it to a given potential, the quantity of electricity that must be put into it in order to charge it in this manner depends to a considerable extent upon the nature of the dielectric (or insulating material) which separates the plates. If the charge that is required when air is the dielectric is taken as unity, then with plate glass as a dielectric the charge will have to be 8.45 (according to Hopkinson), in order to bring the potential of the condenser up to the same value as before. If the space between the plates is filled with common turpentine, a charge 2.23 times as great as that required with air as the dielectric must be communicated to the condenser. It is evident, from these facts, and from others of the same nature, that electric induction depends, to a large extent at any rate, upon the nature of the medium which separates an electrified body from the other bodies upon which the inductive influence is felt. The constants that are given above are known as the "specific inductive capacities" of the dielectrics to which they refer.

Electrodynamic induction is the basis of practically all of the electrical machinery that has been found serviceable to man. The fundamental fact of electrodynamic induction may be stated as follows: If a closed electrical circuit, such as might be formed by joining the two ends of a copper wire, is placed in a magnetic field, then no current will be produced so long as the circuit is everywhere stationary, and the strength of the magnetic field remains every-

INDUCTION BALANCE

where invariable. If the intensity of the magnetic field is increased, a current of electricity will flow around the circuit while the intensity of the magnetism is changing, the intensity of the current being proportional to the rapidity with which the intensity of the magnetism varies. As soon as the magnetism again becomes constant, the current in the circuit ceases. If the intensity of the magnetic field be diminished instead of increased, a current will also be produced in the closed circuit, but it will be opposite in direction to that produced by increasing the magnetic field. Currents produced in this manner are called "induced currents." Instead of varying the magnetic field while the circuit is fixed in position, we may move the circuit about in the magnetic field. If the magnetic field is everywhere uniform in all respects, and the circuit is moved so as to always remain parallel to itself, then no induced current will be produced; but if the circuit is moved from a region where the magnetism is strong to one where it is weak, or *vice versa*, a current will be induced in the circuit, just as if the circuit were kept stationary and the intensity of the magnetism varied. Induced currents are also produced when, instead of being translated from one region to another, the circuit is rotated in a magnetic field, in such a way that the number of lines of magnetic force passing through it is either increased or diminished. In the induction coil the intensity of the magnetic field is varied, while the circuit in which the induced current is to be produced is kept stationary. In dynamos, on the other hand, the magnetic field is maintained sensibly constant, while the circuit in which the induced current is to be produced is rotated or otherwise moved about.

A current moving in a closed circuit produces a magnetic field in the space above it, and this magnetic field, when it varies on account of the variation of the current that produces it, causes the production of induced currents in any closed circuit that may happen to be near. Let us conceive two closed circuits, A and B, to be situated near each other, and let there be a current produced by any means in the circuit A. So long as the current in A is constant, no current will be produced in B; but if the current in A is variable, an induced current will be observed in B, whose intensity depends upon the rate at which the current in A is varying, upon the resistance of the circuit B, and also upon a certain numerical factor, whose value depends upon the sizes and shapes of the two circuits, upon their positions with respect to each other, and upon the nature of the medium (air, oil, or whatever it may be) in which they are placed.

If a pair of circuits, A and B, are near each other, and A is carrying a constant current of intensity C_1 , while B is carrying a constant current of intensity C_2 , then the displacement of either circuit, relatively to the other, would cause induced currents to flow in both; and hence (in general) neither circuit can be moved without the energy of the system being affected. The difference between the energy of a pair of coils that are near together, and the energy of a similar pair of coils that are conveying identically the same currents but are infinitely remote from each other, is equal to MC_1C_2 , where M is a numerical factor whose value depends upon the sizes and shapes of the two circuits, upon their relative positions, and upon the medium

in which they are placed. The factor M is called the "coefficient of mutual induction" of the pair of circuits.

The various parts of a single circuit act upon one another inductively, just as separate circuits do; and a circuit that is wound upon a spool, or otherwise coiled so that its parts come near together, possesses greater energy than the same circuit would have, if it was not so coiled. This fact is expressed by saying that every circuit has a certain amount of "self-induction." The energy that a circuit possesses in virtue of its self-induction is proportional to the square of the current that it is carrying, and to a certain numerical constant called the "coefficient of self-induction," whose value depends upon the size and shape of the circuit, and upon the medium in which it is placed. Like the coefficient of mutual induction of a pair of circuits, the coefficient of self-induction of a single circuit can be computed, for certain simple cases, by methods given by Maxwell, in his "Treatise on Electricity and Magnetism"; but in the general case the computation is exceedingly difficult, and altogether impracticable; so that the values of these coefficients for given circuits are usually determined experimentally, except when a very rough estimate will serve.

The general subject of induction is essentially mathematical in its character, and cannot be properly explained nor understood without the use of the calculus. Consult Nipher, "Electricity and Magnetism"; Maxwell, "Treatise on Electricity and Magnetism." See also the articles ELECTRICITY and MAGNETISM, in this encyclopedia.

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Induction Balance, in physics, an apparatus designed for detecting the presence of fragments of metal, or for studying the electrical conductivity of metals. It consists essentially of four coils of fine wire, an electric battery, a circuit breaker, and a telephone. Let the coils be designated, respectively, by the letters A, B, C and D; A being similar to B in all respects, and C being likewise similar to D. Coils A and B are placed in circuit with the battery, and coils C and D are placed in circuit with the telephone. The coils are disposed in pairs, A being placed near C, and B near D. If the current through A and B is rapidly interrupted, an induced current will, in general, flow through C and D, at each make and break; its presence being indicated by the sounds that it produces in the telephone that is in circuit with C and D. It is possible, however, to dispose the coils and their connections so that the current that A induces in C shall be sensibly equal and opposite to that which B induces in D. When the balance is perfect, no sound will be heard in the telephone. If a piece of metal be now brought near the coil A, the intermittent current in A will induce currents in the mass of the piece of metal, and these, in turn, will act upon the coil C, producing induced currents in this coil which are not compensated by similar currents in D. The loss of balance will be at once indicated by the recurrence of sounds in the telephone; and in this way the metal fragment will betray its presence. The induction balance has been used successfully for locating bullets in the human body. When applied for this purpose to President Garfield, however, it failed to give any useful indications,—owing, it is said, to difficulties of

INDUCTION COIL—INDULGENCE

manipulation due to the presence of metal in the mattress upon which he lay. The instrument is so sensitive that if it is balanced with a genuine coin near one of the coils, and the genuine coin is then replaced by a counterfeit imitation, the telephone at once betrays the substitution. The intensity of the sounds produced in the telephone depends not only upon the size and position of the disturbing piece of metal, but also upon its specific electrical resistance; and hence the balance may be used to compare the specific resistances of metals.

Consult Hopkins, 'Experimental Science'; Thomson, 'Recent Researches in Electricity and Magnetism'; Bell, 'The Induction Balance,' in the American Journal of Science for 1883.

Induction Coil, an electrical instrument used for the production of high potentials, and depending for its action upon the fact that induced currents are generated in a circuit, when the strength of the magnetic field to which the circuit is exposed is varied. (See INDUCTION.) The essential features of the instrument are represented, diagrammatically, in the accompanying cut. A soft iron core is surrounded by two

encre that is used is something over 100 volts. (See WEHNELT INTERRUPTER.) The primary coil on the iron core is made of a few turns of relatively thick copper wire, its purpose being solely to effect the magnetisation of the core; but the secondary coil, in which the induced currents are generated, is made of fine wire, and in order to multiply the inductive effect as far as possible, the secondary is made of great length, often containing many miles of wire. In the celebrated Spottiswoode coil the secondary contained no less than 280 miles of wire. The primary coil, being wound directly upon a soft iron core, commonly has a very considerable amount of self-induction, so that when the circuit is broken by the interrupter the current does not suddenly cease, but continues to flow across the interval at the break for an appreciable fraction of a second, as is readily seen by the strong sparking that occurs at the moment of interruption. In order to reduce the sparking as far as possible, a condenser of suitable capacity is provided, so that when the break is made in the circuit, the "after-current" due to the self-induction of the primary can discharge into the condenser, instead of passing across the break in the circuit and causing a spark. The condenser causes the interruption of the current in the primary coil to be much more sudden, and it materially increases the potential that is developed in the secondary coil, since this is proportional to the rate of variation of the magnetism of the core, and is much greater when the magnetism falls off abruptly than when it persists for an appreciable fraction of a second after the break has been made.

The induction coil was brought into something like its present form by Ruhmkorff, and is frequently known, in consequence, by his name. Improvements in the winding of the secondary coil were introduced by Ritchie, of Boston, about 1857. Ritchie's most important improvement consisted in disposing the secondary wire in sections, which were so related to one another that the risk of internal disruptive discharge through the coil itself might be reduced to a minimum. Induction coils are very generally used in studying the discharge of electricity through gases, for exciting x-ray tubes, and for producing high potentials required in wireless telegraphy. Consult Bonney, 'Induction Coils'; Alsopp, 'Induction Coils and Coil-Making'; Wright, 'The Induction Coil in Practical Work.'

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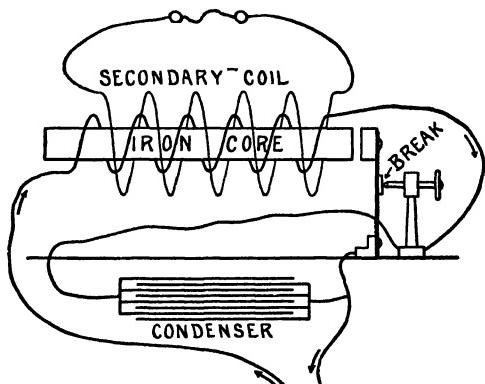
coils of wire, one outside of the other. The outer coil is the one in which the high tension induced currents are produced; it is called the "secondary coil," and is not in direct electrical connection with any other part of the instrument. The inner coil, which is called the primary coil, is wound close to the iron core, and is connected to a battery, so that when the current from the battery is flowing, the primary coil causes the iron core to become magnetised. As is explained in the article INDUCTION, no current is generated in the secondary coil, so long as the magnetism of the iron core remains constant; but whenever the magnetism of the core increases or diminishes, a current is produced in the secondary. A device called a "break" or "interrupter" is therefore provided, so that the magnetism of the iron core may be rapidly established and destroyed. The commonest form of interrupter is that indicated in the cut, which does not call for special explanation, since it is used in electric bells and other simple forms of electrical apparatus. The Wehnelt electrolytic interrupter is greatly in favor among physicists, however, and is now often used in connection with induction coils, especially when they are to be run with the commercial current used for incandescent lighting, where the potential differ-

ence that is used is something over 100 volts. (See WEHNELT INTERRUPTER.) The primary coil on the iron core is made of a few turns of relatively thick copper wire, its purpose being solely to effect the magnetisation of the core; but the secondary coil, in which the induced currents are generated, is made of fine wire, and in order to multiply the inductive effect as far as possible, the secondary is made of great length, often containing many miles of wire. In the celebrated Spottiswoode coil the secondary contained no less than 280 miles of wire. The primary coil, being wound directly upon a soft iron core, commonly has a very considerable amount of self-induction, so that when the circuit is broken by the interrupter the current does not suddenly cease, but continues to flow across the interval at the break for an appreciable fraction of a second, as is readily seen by the strong sparking that occurs at the moment of interruption. In order to reduce the sparking as far as possible, a condenser of suitable capacity is provided, so that when the break is made in the circuit, the "after-current" due to the self-induction of the primary can discharge into the condenser, instead of passing across the break in the circuit and causing a spark. The condenser causes the interruption of the current in the primary coil to be much more sudden, and it materially increases the potential that is developed in the secondary coil, since this is proportional to the rate of variation of the magnetism of the core, and is much greater when the magnetism falls off abruptly than when it persists for an appreciable fraction of a second after the break has been made.

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Indulgence, a theological term which means in the Roman Catholic Church "a remission of the temporal punishment which is still due to sin after sacramental absolution." It does not mean a remission of the guilt of sin, nor of the eternal punishment of sin, nor does it mean permission to commit sin. Indulgences "may be given by the Pope throughout the Church; by primates, metropolitans, and bishops ruling a diocese, within the limits of their jurisdiction." The Council of Trent (1563) condemned those who deny that the Church has power to grant indulgences or who assert that indulgences are useless. This same Council lays down the principle (Sess. xx. cap. 9) that indulgences must be given everywhere gratis. The difficulties which arose in the 16th century over the so-called "sale of the indulgences" were



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not caused by disbelief in the doctrine but by a revolt against the misuse and abuse of indulgences. See LUTHER; TETZEL. Consult: ‘Catechism of the Council of Trent’; O’Brien, ‘Advanced Catechism’; Darras, ‘Church History’; Bellarmine, ‘De indulg. et jubileo libri duo’; Wetzer and Welte, ‘Ablass.’

Indulgence, Declaration of, the proclamation issued in 1687 by James II. of England by which he sought to relieve his subjects from observing laws opposed to their consciences. As the persons then suffering most from the laws were Roman Catholics, and as the laws would leave them free to worship according to their consciences, the proclamation was opposed by many king’s subjects. Seven bishops of the Church of England refused to order their clergy to read the king’s proclamation. Charles II. issued two similar indulgences in 1662 and 1672, both of which were unpopular with the people outside the Roman Catholic Church. The dissenters in England and Scotland, who might be benefited by the proclamation, refused to share toleration with the Roman Catholics.

In'dus (Sanskrit, *Sindhu*), the chief stream of the northwest of India, and one of the great rivers of the world. It has a length of about 1,900 miles, and drains an area of more than 360,000 square miles. It rises in Tibet on the north of the Himalaya Mountains, nearly 100 miles northwest from the sources of the upper Brahmaputra (q.v.), on the north side of the mountain mass of Kailâs, 18,000 feet above sea-level. In the upper part of its course it takes a northwesterly direction along the northern foot of the main Himalayan range, enters the Kashmir territories, passes through Ladak, below the capital of which, Leh, it receives the Zanskar, farther on the Dras, after which it enters Baltistan. Here it receives, on the right, the Gilgit, from a glacier of the Karakoram, the largest tributary that joins it in the Himalayan regions, and takes the name of Indus or Sind. About 100 miles below this it takes a sudden bend toward the southwest, and after a course of about 180 miles more in this direction it leaves the loftier regions. At the British fortress of Attock in the Panjab — where it is crossed by a great railway bridge carrying the line to Peshawar — it is joined by the Kabul from Afghanistan, and here, 950 feet above the level of the sea, it is nearly 800 feet wide and from 30 to 60 feet deep according to the season. For the rest of its course (about 900 miles) it continues its southwesterly direction till it enters the Indian Ocean. At Kalabagh, 110 miles below Attock, it has a breadth of over 1,400 feet. Arriving in the low-lying country, its waters become charged with mud, and in the rainy season, and by the melting of the snow in the mountains, it overflows its banks. Near Mithankot it receives on the east the Panjnad, or united stream of the Five Rivers of the Panjab. Below the confluence it has a width of over 1,900 yards when the water is low. In Sind it gives off several extensive arms or canals, which are of great value for irrigation; and below Hyderabad it divides into a number of shifting mouths or estuaries, the most navigable of which is at present the Yatho mouth. The delta, formed by the enormous amount of alluvium brought down by the river, has a

coast-line of about 130 miles, and the point or head of it at Tatta is 70 miles from the sea. The tide rises to this distance. The Indus loses much water from passing through dry and desert regions, and much is also drawn off for irrigation; accordingly it brings down much less water to the sea than the Ganges. Vessels drawing more than seven feet of water cannot generally enter any of its mouths; but steamers of light draft ascend from Hyderabad to Multan. A railway ascends the valley of the Indus from the important port of Karachi to Peshawar.

Industrial Commission, a non-partisan body authorized by Congress on 18 June 1898, to investigate the subjects of “immigration, labor, agriculture, manufactures, and business” in the United States, with the utmost fairness to both capital and labor, and report to Congress with suggested legislation, as a basis not only for national law and administration, but for uniformity of State laws. It was empowered to administer oaths in order to obtain sworn testimony, and send for persons and papers, as well as (by a supplementary act) to purchase relevant literature up to \$1,500 a year. The members were to be five Senators appointed by its president, five Representatives appointed by the Speaker, and nine private gentlemen appointed by the President and Senate, fairly representing different industries and branches of national life. Originally appointed for two years, the term was extended to 15 Dec. 1901, and then to 15 Feb. 1902, the last report being dated the 10th. The actual work was done by the private members, who employed 27 experts on the various lines, and examined nearly 700 witnesses; making a report in 19 volumes, of the highest value from the unmatched thoroughness and authoritativeness of the view on every side of our industrial system brought out, and the competence of the witnesses, who represented all grades, from heads of trusts to presidents of colleges, and from lawyers to heads of trade unions, leaving no field untouched. The commission also digested a vast amount of facts from judicial decisions and official documents. The private commissioners were A. L. Harris, S. N. D. North (successor Albert H. Clarke), Ellison A. Smyth (successor D. A. Tompkins), J. M. Farquhar, E. D. Conger, T. W. Phillips, C. J. Harris, M. D. Ratchford (successor C. H. Litchman), J. L. Kennedy. The experts were on warehouse and grain inspection laws, immigration (two, statistics and labor questions), agriculture (four, distribution, labor, speculation, and taxation), labor organizations, prison labor (two), railroad labor, Asiatic labor, strikes, and arbitration, trusts, transportation (two), railroad legislation, taxation of corporations (two), domestic service, pure-food legislation, mining industries, mining labor legislation, tobacco industries, mechanical progress, besides advisory counsel and expert indexing.

Industrial Corporations in the United States, include the large number of trusts, or industrial combinations, formed between 1800 and 1903. As the individual or private business firm gradually gave way to the limited partnership, so the limited partnership in turn practically yielded to the general corporate form of doing business, especially in respect to

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manufacturing which followed the general tendency of business toward consolidation. This was a natural result of the rapid growth of capital, which consolidated for its own benefit. In this development some of the earlier and larger trusts undoubtedly played a very prominent part, creating a precedent, setting an example, as it were, notably the Standard Oil trust and the Sugar trust, both of which have been in corporate form for some years. They were the pioneers in consolidation of manufacturing interests, but compared with the more recent United States Steel Corporation, with its capital of more than a billion dollars, they are but pygmies. The great majority of these combinations have capitalizations in excess of \$5,000,000 each, while only a very few are capitalized at less than \$1,000,000. Many of these manufacturing combinations practically control a very large proportion of the entire business of the country in their particular lines and are ever extending that control to other countries.

The most notable feature in the increase in the industrial growth of the United States from 1883 to 1903 is in the iron and steel industry, in which the production is nearly six times greater than it was at the beginning of that period. The total quantity of pig iron and steel produced in 1882 was 5,360,015 tons. In 1892 the quantity was 14,084,581 tons, and in 1902 it had increased to 31,255,595 tons. The increase in the production of pig iron in 1892 over 1882 was 98.99 per cent; and in 1902 over 1892 it was 49.18 per cent. The increase in the annual production of steel, however, was much greater in proportion. In 1892 it was 183.38 per cent greater than in 1882, and in 1902 it was 174.34 per cent greater than in 1892. Among the advantages of the corporate form over individual ownership which so largely tend to the advantage of consolidations of capital and the supplying of the demand for greater facilities for its employment in industrial fields is the fact that, while stockholders die, the corporation can

go on forever. The ownership of these corporations is divided among hundred of thousands of individual stockholders, who are liable only for the amount of their stock, and which can be transferred without affecting the corporation or its liability and without any trouble. The number of stockholders of four of the largest corporations, for instance — namely, the United States Steel Corporation, the American Sugar Refining Company, the Amalgamated Copper Company and the Standard Oil Company — number about 100,000 persons.

The census of 1900 gave the following statistics of industrial corporations (first table below) :

In 1902 these figures had materially increased, there being 213 industrial combinations or trusts with a capital of \$6,639,019,304, but even these figures are far from the estimates made in 1903 by Moody (Manual of Corporate Securities) who places the total capital at \$9,000,000,000, and who states that the railroad consolidations would increase this to \$15,000,000.

The United States Steel Corporation, the largest of the trusts, and its competition are marvelous examples of the "combination" plan of capital. The following are the figures for 1902 (see second table below) :

Industrial Education. See ART EDUCATION.
Inebri'ety. See ALCOHOLISM.

Iner'tia, a term introduced by Kepler to signify that property of matter in virtue of which it is "inert," so that when a body is at rest, or in a state of uniform motion in a straight line, it preserves its state of rest or of uniform rectilinear motion, unless some agency external to the body acts upon it in such a way as to modify that state. We gain our first conception of inertia by the attempts that we make to move bodies that are at rest, or to stop those that are in motion. Even if they are suspended freely, so that frictional forces are negligible, we find that their state of rest or motion cannot be

No. of Co.'s	INDUSTRIES	No. of plants controlled	Capital issued	
			Stocks	Bonds
40	Iron and steel companies.....	489	\$763,806,295	\$20,614,000
21	Food and allied products.....	277	277,618,300	12,725,900
14	Chemical products	295	278,357,295	9,294,000
11	Metals other than iron.....	113	203,505,600	8,565,000
28	Liquors and beverages.....	258	193,301,158	55,529,142
6	Vehicles (land)	72	189,680,000	10,300,000
4	Tobacco	41	197,184,628	.....
8	Textiles	72	109,514,175	36,944,000
5	Leather	108	184,015,200	13,805,000
7	Paper and printing.....	119	130,006,500	42,611,217
15	Clay, glass and stone, etc.....	203	63,896,858	5,567,500
8	Lumber, etc.	59	39,534,400	275,000
16	Miscellaneous industries	97	238,357,700	332,000
183	Total	2,203	\$2,268,788,109	\$216,412,759

SUMMARY	Capital Authorized	Capital Outstanding
United States Steel Corporation proper.....	\$1,404,000,000	\$1,319,560,000
Underlying securities of 26 controlled properties.....	90,435,656	68,478,656
Securities of 3 companies controlled in the interest of the United States Steel Corporation	139,250,000	131,250,000
Securities of 4 companies operated in harmony with United States Steel Corporation	118,686,200	86,661,000
Grand total.....	\$1,752,371,856	\$1,605,949,856
Securities of 32 of larger competitors of United States Steel Corporation...	452,164,600	385,740,100

INFALLIBILITY — INFANCY

modified without the exercise of a certain amount of muscular force; and by abstracting our own personality in the case, we gradually come to the conception of inertia as a physical property inherent in all bodies. Inertia has been popularly described as a "passive resistance" to change of motion; but this expression is objectionable because it is entirely inaccurate. Freely suspended bodies (that is, bodies that are free from frictional forces,) cannot be said to "resist" forces that are applied to them. On the contrary, they yield instantly to the smallest force; but a small force, when exerted upon a given body, for a given length of time, does not produce as great a change of motion as would be produced by a large force acting upon the same body for the same length of time. The conception of inertia shades insensibly into that of "mass"; the mass of a given body being proportional (by definition) to the velocity that is communicated to the body by a force of standard intensity, acting upon it for a standard length of time. (See MASS; MATTER; MOLECULAR THEORY.)

Infallibility, exemption from the possibility of error. The word is used as applied to arguments, statements, reasoning, or the formation of judgments, and does not include impeccability, or exemption from the error of sin. The infallibility of the Church as believed by Roman Catholics means that "the Church can neither deceive nor be deceived in matters of faith and morals"; and she is limited to the definition of truths already contained in Scripture and tradition. The seat of infallibility rests in the Pope as successor of Saint Peter (Matt. xv. 18), and in the bishops in communion with the See of Rome, whether dispersed or united in a General Council (q.v.). In the acts of the Vatican Council, held in Rome in 1870, the following is the text defining the nature of the infallibility of the Pope: "The Roman Pontiff, when he speaks *ex cathedra*, that is to say, when in the exercise of his office of pastor and teacher of all Christians; he, in virtue of his supreme apostolic authority defines that a doctrine on faith and morals is to be held by the whole Church, by the assistance of God promised to him in the person of blessed Peter, has that infallibility with which it was the will of our Divine Redeemer that His Church should be furnished in defining a doctrine on faith or morals, and that therefore these definitions of the Roman Pontiff, of themselves and not through the consent of the Church, are irrefutable." The Greek Church, the Church of England, and the Protestant Episcopal Church which is its representative and in communion with it in the United States, believe that infallibility resides in the universal Church in accordance with Christ's promise of the Spirit that should guide His followers unto all truth. Consult: Allies, "See of Saint Peter"; Ballerine, "De Primatu"; "De Potestate Summ. Pontif."

In'famy and Infamous Crimes, in common law the first means disqualification from giving legal evidence as a result of having committed the second, the theory being that a person capable of such crimes is incapable of speaking the truth. Both in Great Britain and generally in the United States this disqualification has been abolished by statute, and previous convictions

for crime have been considered to affect a person's credibility without impairing his legal capacity to give evidence. Infamous crimes are strictly those which entailed infamous punishments. The fifth amendment to the Federal Constitution speaks of "capital or otherwise infamous crime" and we read in 2 Dane, Abridgement, 569, 570: "Punishments clearly infamous are death, gallows, pillory, branding, whipping, confinement to hard labor and cropping." Infamous punishments include imprisonment in State prison, or penitentiary with or without hard labor, and crimes which entail such punishments are undoubtedly to be considered infamous crimes, in the sense implied in the fifth amendment to the Constitution.

Infancy. The term infancy is used variously by different writers to include a shorter or longer period of the earliest stage of human existence. By most writers it is limited to the first 12 or 14 months, extending to the time when the baby begins to walk and to talk, and so is synonymous with a "babe in arms"; many medical authors would make it include the whole period of the first dentition, or up to about two and a half years. The characteristics of the period are utter helplessness, rapid growth of body, gradual development of muscular functions and great impressibility of the nervous system. In mankind this helplessness is more marked and the period of dependence is longer than in any other of the higher animals. It has been pointed out by John Fiske that the present elevation of man above other animals is due largely if not entirely to this lengthened period of plasticity,—to his prolonged immaturity. Man is born with only a few of the lowest vegetative capacities fully developed, such as digestion, respiration, and circulation; the muscular and nervous functions are latent and only gradually develop; while the higher functions of the mind go on evolving until the fifth decade of life. A long infancy or period of immaturity means a great capacity for development.

Birth and Heredity.—The infant comes into the world with a fixed sum total of vital force, along with certain hereditary tendencies in development toward health and, perhaps, toward disease. These hereditary tendencies are all modified by the physical, social, intellectual and moral status of the child's family and surroundings: in a word, they are vastly influenced by the child's environment. Heredity was formerly regarded as the most important factor in the child's life; but heredity is really only one of three great factors,—the others being the nutrition of the child, and his physical, intellectual and moral environment. During the plastic years of infancy, childhood and adolescence, a bad heredity can frequently be overcome by proper management: on the other hand, the capital of a good heredity can be squandered. Nature always tends toward the normal or healthy, so that there is always the possibility for a bad heredity to be obliterated if only the natural tendency is assisted. More then depends on the nutrition and environment of the infant than upon its heredity.

Nutrition: Breast-Feeding.—The best method of nourishing the infant is nature's way—to have it nursed by the mother. But for various

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reasons this is often impossible. Modern life—and especially city life—has in some way rendered a large proportion of women incapable of producing breast milk for their offspring. And the number of these mothers who desire to nurse their infants but cannot is increasing each year. Again, in not a few instances, the infant does not thrive upon the breast-milk, even though it may be abundant. In both these classes of cases some form of artificial or substitute feeding is a necessity. Good wet nurses are so difficult to procure in the United States that artificial feeding is generally preferable unless the baby is premature or feeble and failing: then the services of a wet nurse may be needed to save the infant's life.

Artificial or Substitute Feeding.—The best available substitute for human milk is an adaptation of fresh, clean unadulterated cow's milk. The milk should be diluted and otherwise modified to suit the infant's feeble digestive powers, and it should be given preferably, without being scalded or sterilized. In summer, or when there is any doubt as to the freshness of the milk, the cleanliness of the dairy or the careful handling of the milk, "Pasteurization," or heating the food to a temperature of 155° F. is advisable. Details as to milk modification and Pasteurization can be found in any book on "Infant Feeding." Ready-made infant foods,—the canned or bottled proprietary foods—do not contain the right ingredients for properly nourishing the infant, and their prolonged exclusive use is nearly always followed by some form of malnutrition—especially scurvy and rickets. These proprietary foods contain large proportions of sugar or starch, and so make fat babies, but such infants are generally pale, have feeble powers of resistance, and are prone to succumb to disease of the lungs or of the digestive tract. When the prepared infant foods are used as additions to milk they are less objectionable, and may at times be of advantage.

Weight and Development.—The infant that has been properly nourished before birth and is born at full term weighs on the average about 7½ pounds—boys being somewhat heavier than girls.

During the first few days, while the nourishment from the mother is insufficient, the baby regularly loses from six to eight ounces; but it soon begins to gain, and if the nutrition is normal and the infant remains well, there will be a steady increase in weight throughout the first two years. The gain during the first year is more regular, however, as well as more rapid than that during the second year. During the first three months the increase in weight each week is about half a pound: from the third to the sixth month the weekly gain is somewhat less, from four to six ounces: from the sixth to the ninth month about four ounces, and after the ninth month a little more, usually a weekly increase in weight of from four to six or even eight ounces. By the end of the fifth month the baby that has been perfectly well and is being properly nourished should have doubled its birth-weight and weigh about 15 pounds: at the end of the 15th month it should weigh three times its weight at birth. In many instances the baby will treble its original weight by the end of the first year; but 21 pounds may

be considered the average weight for the end of the 12th month. Infants that were very large at birth do not increase so rapidly; while small or premature babies are apt to make a gain that is greater in proportion to their original weight. "Hand-fed" or "bottle" babies should weigh on the average about the same as breast-fed babies,—provided that they have had no disturbance of their digestion; the food must, however, have been perfectly adapted to the infant, and this is often a very difficult problem.

Height and Other Measurements.—At birth the length of the average baby is about 20 inches; during the first six months there is an increase of four to six inches, and during the second six months from three to four inches more; by the end of the second year the height is 32½ inches, a growth of over a foot since birth. By the end of the third year the stature is one half of the adult height. The head grows very rapidly during infancy and early childhood. The circumference of the head at birth is from 13 to 14½ inches; by the end of the sixth month it is 16½ or 17 inches; at the end of the first year 18 inches, and at the end of the second year it is 19 inches. By seven or eight years the circumference of the head almost equals the adult size of 21 inches. This is visible evidence that during the first months and years of life the brain is increasing in volume more rapidly than any other organ in the body,—the head or brain-box expanding to conform to the enlarging brain. The soft spot or "fontanel" usually closes between the 15th and the 20th months. The chest is smaller than the head at birth (13 inches), but its circumference increases rapidly, so that at 18 months that of the chest and the head are equal. After this the chest grows steadily but gradually until puberty, when there is a very rapid increase for four or five years. Aside from the regular increase in weight and measurement, the healthy infant shows other signs of well-being. The baby's flesh is firm, and the skin is satiny and elastic: the color is pink, and the body and extremities are well rounded. Very fat babies are not necessarily stronger or healthier than those that weigh less: as has already been noted they are apt to be pale, flabby and of weak resistance to disease. The healthy baby is happy and playful when awake, and sleeps from 16 to 20 hours out of the 24,—longer the younger the baby. It is desirable that the growing child have a nap during the day up to the time when kindergarten work is begun; with nervous or poorly nourished children the practice should be continued until the seventh or eighth year.

Muscular and Mental Development.—These begin with the entrance of the infant into the world, but are slow in unfolding. At first the grosser movements performed by the muscles working over the larger joints, next more complex movements, and during later childhood and early adolescence the finer movements requiring nice adjustment and delicate co-ordination. Hence it is that occupations or accomplishments requiring great manual dexterity, such as violin or piano-playing, should be taken up early,—"before the hand gets stiff," as the phrase is. The first movements are those of the legs, arms,

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and neck: they are not purposeful but merely reflex. By the sixth week the infant can hold up its head, when the back is supported, but very unsteadily until about three months old. At some time in the third or fourth month the infant makes its first voluntary movement, grasping at some object in the range of vision. Within a month or two later the baby can co-ordinate the muscles of the eyes, arm and hand sufficiently to take firm hold. Sitting alone is an accomplishment of the seventh or eighth month, and creeping also begins at about this time, if the baby is ever to creep at all. During the eighth or ninth month the baby begins to stand, having made the attempt for many weeks before; at ten or eleven months the infant can stand alone, and shortly after the twelfth month the first tottering steps are taken. It is some months before the baby is secure upon the feet, the maintenance of the equilibrium requiring nice control of many groups of muscles. Healthy infants differ greatly as to the time when they can walk alone, some walking at as early as ten months, while others may not walk until eighteen months. Very fat babies walk late but, in some instances, an excess of caution seems to be a factor. If a child is far behind in performing any of these muscular functions, a physician should be consulted so that careful examination may be made for signs of rickets or of disease of the brain or of the spinal cord.

Development of Special Senses.—For the first few days the newly-born infant avoids the light, and for many weeks cannot endure a direct bright light. Perception of light soon develops, the color first attracting attention being red. Clear perception of objects comes during the fifth month. Hearing is in abeyance for several days, a baby at birth being practically deaf; but after a week or ten days this function begins, and later hearing becomes very acute, the infant being able to recognize the mother's voice or a footstep at about three months. Loud sounds cause the baby actual pain, so severe are their impressions on the delicate auditory apparatus. The sense of touch (contact) is early developed, especially in the tongue and lips; but sensitiveness to pain is very dull during infancy. Heat and cold are recognized from an early period, the variation of a few degrees in the temperature of the food causing the baby to refuse it. Taste and smell also are present at birth, taste being very discriminating.

Development of Speech.—Speech is very closely related to the higher functions of the brain, and is therefore the last of the simple functions to develop. Usually a baby begins to say "Mamma" and "Papa," with clear knowledge of the meaning, toward the end of the first year. Next names of objects and persons are learned and soon two words are put together. Then verbs are used, and about the end of the second year little sentences are made. Pronouns are regularly the last of all the parts of speech to be used. During the third year speech develops very rapidly, the baby bringing out some new term or expression almost daily. There are great variations in the time when children begin to talk; and for this there are many reasons. Girls generally talk earlier than

boys by two or three months: babies that associate in the nursery with other children talk earlier than only children. If, however, a young child reaches the age of two years without attempting to talk, mental backwardness or organic brain disease is apt to be the cause. Tongue-tie is seldom the cause of backwardness in talking, although it does produce imperfect articulation.

Dentition—Teething.—The first teeth appear about the sixth or seventh month, but a perfectly healthy baby may have no teeth until 10 or 11 months old, or on the other hand may cut the first tooth at four months. The regular order is as follows: lower central incisors, upper central incisors, upper lateral incisors, lower lateral incisors—each pair coming at intervals of three to six weeks: at about the fourteenth month the front double teeth (anterior molars) appear in the two jaws, and four or five months later the canines, known popularly as the "eye and stomach teeth." Finally, the last four molars appear sometime between the twenty-fourth and the thirtieth month, and these complete the twenty teeth of the first dentition. Teething babies are apt to be fretful, they have a reduced resistance against disease, and they are prone to slight disturbances of digestion. To attribute most of the ills of infancy to the process of teething is a great mistake; usually some other and better cause for the disturbance can be found if the baby is carefully examined. During the time when the successive pairs of teeth are coming through the gums, the usual food should be largely diluted, so as to prevent any serious indigestion.

Fever.—Sudden high temperature is readily produced in young children by slight causes, inasmuch as the heat-regulating centre in the brain is but poorly developed. Again, the temperature in disease is erratic, and is apt to be higher than in adults suffering from the same ailment. Only persistent high temperature need cause anxiety.

Convulsions.—A characteristic of infancy is the easy excitability of the motor side of the nervous system. Hence convulsions or spasms are much more frequent and less serious than in adults. The immediate cause of the motor explosion may be an overloaded stomach, fright or mental excitement, or the fever of an oncoming disease. Severe earache, intestinal worms or a paroxysm of whooping cough may also serve as an exciting cause. Underlying or predisposing causes are a nervous heredity, malnutrition, or rickets; or there may be organic disease of the brain or the kidneys. The spasm usually begins with a turning of the eyes to one side and twitchings or grimaces of the face: there may be frothing at the mouth; then the arms and legs are rapidly contracted and relaxed; later the body stiffens out, the breathing becomes noisy and labored, the face,—especially the lips—becomes livid. Shortly afterward the body relaxes, the breathing becomes easy, and spasm ceases for the time being—having lasted anywhere from five to thirty minutes. Until the physician arrives certain simple measures are of value. The infant should be undressed, wholly or partially, and put into a warm bath (not warmer than 105° F.) to which a handful of mustard flour

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has been added, and the baby should be rubbed all over while in the tub for about five minutes. Then remove from the bath and lay between blankets, putting a warm bottle at the feet and an ice cap or cold compress on the head. If the baby can swallow, a full dose of castor oil should be given. Most convulsions are due to the presence of decomposing food-remains in the alimentary tract, and the spasms usually cease when the stomach and bowels have been thoroughly evacuated.

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Infant, in law. By the common law persons come to majority at the age of 21 years, until which time they are called in law *infants*, but by common usage in the United States the word *minor* prevails. Infants cannot, in general, bind themselves by contracts, as they are supposed not to have sufficient discretion and ability for this purpose. But this is their privilege, and their contracts are accordingly held in general not to be void, but only voidable at their election; and they may elect to avoid their contracts during their minority, except such as they may have entered into for necessaries suited to their condition in life, but they cannot confirm them so as to be bound by them until their majority. Infants may possess property, but it must be under the management and control of a guardian. They have not the right of citizens as to voting, and discharging other political functions. But in regard to crimes and punishments, and trespasses and private wrongs, their conduct is regulated by the same laws as that of the other members of the community, in case of their being of sufficient age and discretion to understand their duties and obligations. And for this purpose no general limit can be assigned, as some children are much more intelligent than others of the same age; and it will again depend, in some degree, upon the nature of the offense committed, or the wrong done, whether a child of any given age can be considered legally guilty of it, since some offenses and wrongs can be more easily understood to be such than others. The law, in general, has a tender regard to youth, and does not permit them to be convicted and punished for offenses and trespasses unless it appears clearly that they have sufficient knowledge and discretion to distinguish them to be such. There are exceptions to the incapacities of minors as to contracting, and these exceptions are made for their benefit. Thus an infant not sufficiently furnished with necessary clothes, food, or instruction, by his parent or guardian, and not being under the immediate superintendence of the parent or guardian, may make a valid contract, in respect to those subjects, and such contract may be enforced against him. Infants require the consent of parents or guardians to marry. The jurisdiction in respect to infants is generally vested in either probate or orphans' courts. These courts appoint guardians to take charge of the property of infants, and, in case of the decease of the father, to take charge of their persons; but during the life of the father he has the guardianship and control of the persons of his children until they are 21 years of age.

Blackstone thus defines infant: "Infants have various privileges, and various disabilities; but their very disabilities are privileges, in order to secure them from hurting themselves by their own improvident acts. An infant cannot be sued but under the protection, and joining the name of his guardian, for he is to defend him against all attacks as well by law as otherwise; but he may sue either by his guardian, or by his procurator amy, or alone for wages in the county courts. In criminal cases an infant of the age of 14 years may be capitally punished, but under the age of 7 he cannot. The period between 7 and 14 is subject to much uncertainty; for the infant shall, generally speaking, be judged *prima facie* innocent; yet if he was *doli capax*, and could discern between good and evil at the time of the offense committed, he may be convicted, and undergo judgment and execution of death, though he has not attained to years of puberty or discretion."

Infant Jesus, Daughters of the Congregation of the, is an order in the Roman Catholic Church. It owes its origin to Anna Maroni, a native of Lucca, who having come to Rome entirely destitute, succeeded by her industry in securing a competency. In more advanced years, her charitable feelings prompted her to establish an institution where poor girls should be instructed in such work as would enable them to earn a livelihood. The clergy approved of her plan, and afforded her much assistance, and it was finally established as a regular institution, and in 1673 Pope Clement X. acknowledged the existence of the society, gave it by-laws, and endowed it with sundry privileges, under the appellation of "Daughters of the Infant Jesus." The number of the "Daughters" allotted to each convent was fixed at 33, in commemoration of the number of years Jesus lived upon earth. The novitiate lasts three years; the sisters make vows of poverty, chastity and obedience. Such as may wish to leave the convent are allowed to do so before taking the vows, but, in that case, they are to leave to the convent all they brought to it at their admission. Prayers and fasts are strictly enforced. The regular habit of the order consists of a wide, dark brown dress, and a white hood.

Infanta, ēn-fāntā, Philippines, a former Spanish commandancia of the island of Luzon, consisting of a narrow strip of territory on the Pacific coast with Nueva Ecija on the north and Tayabas on the south. In 1902 it was made a sub-province of Tayabas, "the inhabitants to enjoy the same rights and privileges as if the said territory had been originally incorporated in the province of Tayabas." The surface is very rough and mountainous and the construction of roads impossible except at heavy cost; several trails lead over the mountains to the central provinces. The forests are valuable, among the trees most important to commerce is the balate, which produces the balate gum. The agricultural methods are most primitive; the chief crops are rice, cocoanut, chocolate and coffee; the most important industry is the manufacture of nipa wine; there was formerly a large manufacture of cocoanut oil in Infanta, but this industry was paralyzed by the hurricane of 1882. Pop. 10,800.

INFANTICIDE — INFANTRY

Infanticide, the murder of a child born alive, is a crime of frequent occurrence. The main cause of the crime is shame, induced by a dread of the social disgrace attaching to mothers of illegitimate children; though in many instances infanticide has been the result of violence produced by puerperal insanity. The morbid disposition to kill the newly born has also been observed in certain of the lower animals. The sanctity of human life, from its beginning to its close, is a maxim of modern civilization, and the law treats as a murderer whoever wilfully terminates it at any stage. According to the law of England every woman who employs means to procure criminal abortion is guilty of felony, and liable to penal servitude for life, or not less than three years; and severe penalties are inflicted on those who aid women to procure miscarriage. The concealment of birth is a misdemeanor, and may be punished with imprisonment for two years. In the United States, when a child's death is occasioned by an illegal act, such act is considered either murder or manslaughter according to the circumstances. The crime, however, is rarely punished, and in large cities many cases occur each year which are never reported to the authorities.

Infanticide was prevalent in Greece and Rome. In modern times many barbarous peoples are guilty of wholesale child-murder. Among some of the Pacific Islanders and aboriginal Australians there is a great destruction of infant life. The Hindus used to destroy female children without compunction. In China infanticide is said to be very common.

Infantry ("the juveniles," probably at first the knights' pages), foot soldiery, as distinguished at once from cavalry and artillery. In all ages this has naturally formed the numerical bulk of armies, but its tactical importance has varied greatly with circumstances. The name cannot be given to the mere unorganized fighters of barbarian *mélées*; it implies some organization, and at least the rudiments of tactics. The first large armies were the Egyptian and Assyrian, continued by the Persian: the social system was aristocratic, and the large plains ideal for the utility of cavalry; hence the infantry was rather an auxiliary, to complete a rout after the mounted lords and the chariots had broken the ranks, than the main fighting body. The first development of infantry as the chief reliance was naturally in the small Greek states, whose independence rested on their citizen soldiery, and whose rough territory made cavalry evolutions difficult. Cavalry was therefore used mainly to guard flanks and to skirmish; the Spartans for a long time would not use it at all. The infantry was divided into classes according to armor; hoplites (with heavy defensive armor, long spear and dagger), psiloi and peltasts (very little armor, light barbed javelins to throw), and gymnetes (sharpshooters, light-armored and with slings or bows). The battle formation was the famous phalanx, whose one basic principle was the value of mass and momentum, and which was irresistible either for attack or defense against barbarians who lacked firmness in the ranks. It was commonly a rectangular block eight ranks deep, so that only the first two or three could use their

spears at the same time, the rear ranks serving only for instant reinforcement and for impact; the men were from 18 inches to 6 feet apart, according to conditions of defense or attack; the phalanx had usually 2,000 to 4,000 men, but sometimes as high as 10,000 or more. Sometimes the formation was the triangular wedge. The first great improvement was by Epaminondas, who made the ranks 50 deep, and by the enormous impact crushed the Spartan phalanx at Leuctra. This was the Napoleonic principle of concentration at the critical point, most of the Spartan army being allies with no heart in the fighting, and kept at bay by a few skirmishers. Nevertheless, the step was backward except for immediate necessities, as it increased the main vice of the phalanx — its immobility, which made it break up dangerously on bad ground, and gave little power to change front or execute flanking movements. In later tactics the larger ones were subdivided into companies of 120 with a distance equal to the front, forming an approach to the legion; and the latter was copied also in the formation by lines, increasing rapidity of movement and flexibility on difficult ground, as well as power of extension and so of flanking. The Macedonian *sarissa* or long pike doubled the number of ranks which could thrust at once over each other's shoulders. But the whole system went down before the Roman legion, which essentially maintained its position till the Empire too went down. It consisted normally of 1,200 each of hastati (spearmen), principes (veterans), and velites (light troops), 600 pilani (veteran reserves), and 300 equites or cavalry. It was divided into three lines and 30 maniples or companies, and combined solidity with ease of maneuvering.

In the Middle Ages, till the general use of gunpowder, the feudal system insured the degradation of the infantry, as it depended on the fighting power of the knight, and consequently lavished all the care and expense on perfecting his armament. But even without this, the same result would have come, for without good field artillery, and with only bows and arrows at their best, the heavily armed man was invulnerable, as the Spanish conquests in the New World amply prove. Hence the logical result was the extension of defensive armor till some new missile force came in. But the cost of this was so great — a full suit of steel armor cost about \$2,000 — that only the richer even of the knights could afford them, no king could raise money to equip a standing army, and the aristocracy would combine to refuse him money for such a purpose; and the rank and file were scattered and slaughtered in face of a charge of a small number of mailed knights. The defeat of the French knights by the English bowmen was that of a disorderly and insubordinate mob, by a splendid archery which slew their horses and pierced the cheaper armor. But gunpowder at once changed the whole situation. A serf with a \$10 hackbut could stand out of reach and kill a knight with his costly armor; and a sovereign could collect and arm a great force of these and use them to put down his unruly vassals. Hence armored knights and horses began to decrease, and standing bodies of foot soldiery with firearms to increase. The change in battle array was correspondent: theretofore, even the ablest commanders had maintained the great depth of 10 ranks, traditional from classic times. Gustavus

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Adolphus reduced this to six, deploying to three under fire; while Tilly and Wallenstein and the other imperial commanders kept to the old phalanx formation. Breitenfeld (1631) and Lutzen (1632) were won by this and Gustavus' light artillery. The introduction of the bayonet about 1650 led to a reduction to four ranks. But the greatest single improvement was due to Leopold of Dessau early in the 18th century: he instituted the chief reforms usually credited to Frederick the Great, and formed the armies with which Frederick won his victories. He reduced the ranks to three, making it possible for all to fire, trained them to maneuver with great precision, and wrote the drill-book which is still the basis of all European and American manuals. Frederick's infantry organization, in regiments of two or three battalions, each 500 to 600 strong, was copied by all the other nations; and the general principle of open order, made necessary from the destructiveness of artillery on close masses of men, and possible by the confidence in each other bred by civilization, is still retained. Broadly, the difference between ancient and modern infantry is that between mass and mobility.

For obvious reasons—cheapness of maintenance, universal availability of men untrained in horsemanship, ability to march and maneuver on all sorts of ground, less liability to be crippled by loss of the animals, etc.—all modern armies consist mainly of infantry; and the nominal horse troops are most often dragoons, or soldiers mounted merely for quickness of movement, but who fight on foot. The quantities of other arms, as cavalry, artillery, engineer corps, etc., are based on the infantry numbers. The proportions vary in different armies and in different functions of the same army, according to nature of service: more or less cavalry and artillery being used according to need of concentration, or action in dispersed bodies. Forces like the United States Western troops a generation ago, for instance, in small squads on detached duty, would have different proportions from a great Continental army in the midst of a campaign. While there is no one system of infantry tactics which can be universally applied, the same cause which has made the change just spoken of has thus far continued to act with steadily increasing force. Artillery continues to grow in power and in range; the danger-line grows ever farther from the enemy; it is nearly impossible, and would be murderously losing, to charge in close column across the 2,000 yards which is now the average range. The system adopted is called "extended order," which means a considerable space between the men, and small bodies acting separately in a charge; each making a rush for some cover not so far off that they will be blown in reaching it, or will be decimated in the attempt. A certain relation between companies and regiments is kept up, to avoid destruction in detail and enable combined action, but precise parade alignment is not attempted. This involves not only the mutual confidence of civilized men, but some of the independent judgment of those who have not had initiative crushed out of them by red tape: the greatest of modern tacticians and commanders have expressed a preference for intellectual quality over mere numbers, even in the rank and file. In the United States, the ex-

tended order was first introduced in the Revolution.

For the organization of the line in this country, see ARMY OF THE UNITED STATES. In addition to this, a few facts may be given: The general orders of 19 May 1877 fixed the strength of the infantry at 9,575 men, in 25 regiments. The pay ranges from \$3,500 a year for the colonel to \$13 a month for the private. The appointments are made from the United States Military Academy, from the ranks after two years' service and severe examinations, or from civil life if there are no eligibles in the others. The arms are the Krag-Jorgensen and the new Springfield magazine rifle, with knife-bayonet. The equipment is knapsack, haversack with implements for meals, canteen, blanket wrapped in piece of shelter tent, and waist-belt with cartridges.

Infection, the introduction of disease-producing micro-organisms in the body. Infection may result in a number of different ways. Micro-organisms may be introduced by means of direct injury. When a person falls and cuts the hand, the bacteria of pus-production or of tetanus may be so introduced, and blood-poisoning or tetanus may develop. Many infections come by means of the intestinal tract. Thus typhoid is commonly obtained from milk or drinking-water. The intestinal worms, tape-worm, roundworm, are contracted in this manner, and a number of other parasites, particularly the trichina, may come from infected food taken into the alimentary canal. Infection may also occur by means of the air-passages. The bacillus of tuberculosis is most often taken into the body in this way, and finding suitable soil, it causes the development of the dread disease. The bubonic plague is frequently contracted through the disease-germ entering the air-passages. At the present time it is deemed not unlikely that a number of infectious diseases, notably influenza, diphtheria, scarlet fever, measles, whooping-cough, are contracted through the respiratory tract by infection with the exciting cause. Occasionally direct contact seems necessary for infection, as in gonorrhœa and syphilis. In malaria, and probably in yellow fever, the active agent that causes the disease is introduced into the body by the bite of an insect, the mosquito. In malaria one particular genus (*Anopheles*) serves as an intermediate host in the developmental history of the parasite, in a manner analogous to the history of the development of a number of the intestinal worms. It is not unlikely that a large number of diseases may be disseminated by the bites of insects of one kind or another. In all the infectious diseases the element of a real, live, and active contagion should never be overlooked. Infectious diseases do not spring out of nothing. There must be some sort of contact in order that a person become infected. A most important part of the treatment of all infectious diseases is the protection of other people by proper care of all one's own excretions during sickness. The doctrine so frequently taught by some that sickness is ignorance is an important half-truth. But for the ignorance of people concerning the proper care of those afflicted with infectious diseases with reference to the protection of others, measles, diphtheria, scarlet

INFIDEL — INFINITE

fever, whooping-cough, typhoid fever, consumption, and a number of other maladies would be entirely eradicated from civilized communities.

Infidel, in modern parlance, one who deliberately rejects the Christian faith after obtaining knowledge of it. In former times a man might be an infidel who had never heard of Christianity. *Infidelis* in ecclesiastical language means "unbelieving," and is applied to unevangelized heathen as well as doubters and apostates. Thus in the Roman Catholic Church a bishop *in partibus infidelium* merely means a bishop whose diocese is set in heathen countries.

Infinite, a term in metaphysics, which means a reality which has no limit or boundary, in time or space. The idea of the infinite is as old as the Ionian philosophy, when Anaximander (610 B.C.) declared that the one in the many, the basis of being in Nature, was *τὸ ἄπειρον*, the infinite. The reality of infinitude has been the source of much controversy, and the tendency of many modern philosophers is to deny it. "An infinite number," says Bosanquet, "would be a number which is no particular number, for every particular number is finite. It follows from this that infinite number is unreal." On the other hand F. H. Bradley states the contrary, in the clearest terms, "We may be asked whether Nature is finite, or infinite. . . . if Nature is infinite, we have the absurdity of a something which exists; and still does not exist. For actual existence is, obviously, all finite. But, on the other hand, if Nature is finite, then Nature must have an end, and this again is impossible. For a limit of extension must be relative to an extension beyond. And to fall back on empty space will not help us at all. For this (itself a mere absurdity) repeats the dilemma in an aggravated form. But we cannot escape the conclusion that Nature is infinite. And this will be true not of our physical system alone, but of every other extended world that can possibly exist. . . . Every physical world is, essentially and necessarily, infinite."

It seems as if Aristotle had a clearer and more logical view of infinity, *τὸ ἄπειρον* than many modern Positivists, such as Bosanquet. He says, *λειτεραὶ οὐν τυδεῖς εἰναι τὸ ἄπειρον*. He means of course, that, with regard to finite human intelligence, the infinite remains unrealized, although logically it could be realized, and of course, when we speak of infinite time, or infinite creative change in nature, we speak of something which potentially exists, but is only gradually becoming actual.

Infinity is also applied to the divisibility of matter. This is termed "infinite fission." If an atom is divided into two parts, and each of these is again divided into two parts, the mind cannot conceive of any individual fragment resulting from this division as incapable of being divided.

Professor Royce of Harvard has undertaken the task of vindicating the concept of the actual Infinite against the charge of self-contradiction. He is controveering Mr. F. H. Bradley of Oxford, who while he admits "we cannot escape the conclusion that Nature is infinite," expresses also his belief that such an assertion is a contradiction in terms. Professor Royce accomplishes this vindication by proving the following theses:

1. The true Infinite, both in multitude and in organization, although in one sense endless, and so incapable in that sense of being completely grasped, is in another, and precise sense, something perfectly determinate. Nor is it a mere monotonous repetition of the same, over and over. Each of its determinations has individuality, uniqueness, and novelty about its own nature.

2. This determinateness is a character which, indeed, includes and involves the endlessness of an infinite series; but the mere endlessness of the series is not its primary character, but simply a negatively stated result of the self-representative character of the whole system.

3. The endlessness of the series means that by no merely successive process of counting, in God or in man, is its wholeness ever exhausted.

4. In consequence, the whole endless series, in so far as it is a reality, must be present, as a determinate order, but also all at once, to the absolute experience. It is the process of successive counting, as such, that remains, to the end, incomplete, so as to imply that its own possibilities are not yet realized. Hence, the recurrent processes of thought reveal eternal truth about the infinite constitution of real Being,—their everlastingly pursued Other; but themselves,—as mere processes in time—they are not that Other. The true Other is, therefore, that self-representative system of which they are at once portions, imitations and expressions.

5. The Reality is such a self-represented and infinite system. And herein lies the basis of its very union, within itself of the one and the many. For the one purpose of self-representation demands an infinite multiplicity to express it; while no multiplicity is reducible to unity except through processes involving self-representation.

6. Nevertheless, the Real is exclusive as well as inclusive. On the side of its thought the Absolute does conceive a barely possible infinity, other than the real infinity, a possible world, whose characters, as universal characters, are present to the Absolute, and are known by virtue of the fact the Absolute thinks.

This brings metaphysics face to face with the notion of a Supreme Being, who is infinite or absolute. With the mystics God is infinite love, joy and wisdom to his human children. The Hindus taught that God was the infinite universe, the Other, the reality. "That (that is, the Universe) art thou," was their dictum. Christianity teaches that "God is of infinite power, wisdom and goodness," of which qualities the best of men have but a finite endowment.

The term "infinite" was introduced into geometry by Kepler in his 'Nova Stereometria Doliorum; accessit Stereometria Archimedea Supplementum.' Thus he considered a circle as formed by an "infinite" number of triangles, having their vertices at the centre, and their bases at the circumference. A cone likewise, he taught, was composed of an "infinite" number of pyramids, having their vertices at the vertex, and standing on an "infinite" number of triangular bases, bounded by the circular base of the cone. In this sense infinite means incommensurable, not to be expressed by a finite mathematical formula. Consult: Bradley, 'Appearance and

INFINITIVE — INFLAMMATION

Reality'; Royce, 'The World and the Individual'; Bosanquet, 'Logic'; Couturat, 'L'Infini mathématique.'

Infin'itive, the indefinite mode in which the verb is represented without a subject. As the verb expresses an action, or a state, it generally belongs to a subject whose action or state is expressed; but if we wish to express the mere idea of this action or state we use the infinitive, which, therefore, in many languages is employed without further chance as a substantive—for instance, in Greek and German—only preceded by the neuter article; but as the verb expresses an action or state under certain conditions of time, the infinitive can also express the action or state in the present, past, or future, though these conditions are not expressed in all languages by peculiar forms. Some languages have not even a peculiar form for the infinitive, and must express it by some grammatical contrivance, as is the case in English, where it is denoted by *to* prefixed to the general uninflected form of the verb, as *to love* = Latin *amare*; *to have loved* = Latin *amavisse*. The infinitive may be regarded as the point of transition from a verb to a substantive, and is often used as the subject of a proposition. Like a noun, also, it is often used as an object, as I love *to ride*.

Infin'ity, and the Infinitesimal. See INFINITE.

Inflammation, a term long used to indicate the phenomena that follow mechanical, chemical, or physical injuries to living tissues. These changes have been described for centuries as rubor (redness), calor (heat), dolor (pain), and tumor (swelling), which are the phenomena particularly seen on surface inflammations. At the present time the idea is becoming fixed that inflammation is a conservative process, the phenomena attending nature's effort to rid the tissue of harmful substances. In the normal process of repair of an injury there are changes which closely resemble the milder types of inflammation; but when to a mechanical, chemical, or physical injury there is added a growth of micro-organisms, the reply on the part of the body-cells differs from the ordinary repair of injury. The changes witnessed depend upon the strength and kind of invading micro-organism and the particular tissue invaded. The first change is *hyperemia*, a suffusion of the part with blood from capillary dilatation; following this the liquid part of the blood, the serum, is poured out into the tissues and offers its resisting powers to the poisonous substance. If these measures be insufficient, the white blood-cells called phagocytes congregate in the tissues, destroying the invading organisms, by actually consuming them and neutralizing their toxic products. During this struggle there is more or less death of the cells, called "degeneration"; large masses "slough"; the remnants of the cells and the phagocytes killed form the thick fluid called pus. When an inflammation goes on to the formation of pus, it is spoken of as *purulent* or *suppurative*. Certain poisons cause a peculiar reaction on the part of the tissues, characterized by the formation of new tissue that is unable to carry on the function of the part. This tissue is the same as the connective tissues, and the process is called *productive inflammation*. The poisons that continue to act for a long time are

particularly apt to cause this reaction, and the inflammation is called *chronic* because of its permanency. Catarrhal inflammations are these same processes when they occur in mucous membranes; the appearance of these catarrhs, however, is different, owing to the peculiar structure of mucous membrane and to the fact of the epithelial covering offering excellent resistance to invasion. When death of cells occurs they can readily be cast off. Croupous inflammation is the term used to describe those in which there is considerable destruction of the superficial layers of the mucous membrane, which, with the fibrin of the blood, forms a coating or "false membrane" on the surface. Granulation tissue (q.v.) is the name applied to the tissue formed during the repair of an injury. Names are given to certain types of inflammation having a characteristic appearance to the naked eye, but microscopically there is nothing absolutely distinctive in these except their arrangement. Particular examples of these are tubercular and syphilitic inflammations.

The majority of the diseases of the body that we recognize as entities are due to inflammation in some tissue or organ, but the picture depends on the various changes in the functions of different parts of the body. The kind and virulence of the generated poison, together with the reaction on the part of the body-tissues, makes the complete picture that we seek to recognize. The treatment of inflammation is, in large part, the practice of medicine and surgery. Efforts to help the tissues combat against invasion are made with more success as knowledge is gathered of the peculiar invading forces and the natural modes of defense. It is not that we wish to combat the inflammation *per se*, but rather to make it unnecessary by helping it to a successful issue. The actual destruction of the bacteria by drugs introduced into the body is of little use, for they would be apt to cause as much destruction of the body-cells as of the invading cells; but their toxines, which cause the actual damage, we are learning to neutralize by the administration of artificially prepared antitoxins, and by placing the body and its special tissues under the most favorable conditions for developing its natural forces of resistance.

In exposed parts of the body, where antisepsics may be applied, the toxic germs may be killed, and various measures that change the blood-supply may be advantageous. Where death of tissue takes place, nature may require help in its removal. It has long been the rule to evacuate pus wherever it is formed, unless its escape from the tissues is easy.

The treatment of chronic inflammation is entirely different, as this is a process where actual structure is changed beyond repair in many instances. The all-important question is whether the tissue can carry on its proper functions; for if it can, the body need not suffer. The inflammatory process is arrested in its progress by the removal of the irritating cause, by improving the blood-supply of the part and the vitality of the body generally. These constitute the measures in general applied for the cure of chronic inflammations, it being understood that the endeavor is to place the tissues in such a condition that they may carry on their functions for the good of the whole organism; and the failure of these measures shows either that they are at

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fault or that the tissue-change has gone too far. Inflammation of any part is indicated by adding the suffix "itis" to the name of the organ or tissue. See BRONCHITIS, COLITIS, LARYNGITIS, MENINGITIS; etc.

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Inflexion (Latin, *inflexio*, a bending), that process in grammar which modifies words when placed in relation to other words in a sentence. Pronominal and predicative roots are combined to form one word in the Semitic and Aryan tongues, which are therefore called inflexional, a process impossible in monosyllabic languages like the Chinese or in languages of the agglutinate order like those of the Turanian family. In grammar, cases, numbers, persons, tenses, etc., are known as inflexions, and in many instances the original affixes can be readily recognized. The Semitic and Aryan families of languages, which admit of phonetic corruption both in the root and the terminations, are called organic or amalgamating languages. The pronominal termination varies according to the person or number. Thus the Sanskrit *mi*, *si*, *ti*, the endings of the three persons singular of the present of the verb, are perhaps from the personal pronouns *ma*, *sva*, *ta*, and the persons of the plural indicate the plural number by the form of the pronominal affixes. The plural of masculine and feminine Greek and Latin nouns of the third declension is probably a contraction of the duplication of *sa*, the pronoun of the third person. The verbs *i*, to go, *as* and *fu*, to be, supply the inflexions of certain tenses of the verb, there being also a pronominal termination varying according to the person. In English the common auxiliary verbs am, do, have, shall, will, may, can, asserting respectively existence, action, possession, obligation, volition, liberty, power, assume the function of inflexions, and are themselves inflected to denote past time. In French the same inflexional law exists, the connection between the auxiliary and the root being closer than in English. *Aimer-ai*, I have to love, that is, I shall love, is compounded of the infinitive *aimer*, to love, and *ai*, I have, the first person present indicative of *avoir*. The same is the case in Italian and Spanish.

Inflorescence, Infruktescence, botanical terms referring respectively to methods of flowering and fruit-bearing. The flowering shoot, says Strasburger, frequently bears only a single flower, which may then be either axillary or terminal. In many cases, however, the metamorphosis of the generative region, which results in the production of flowers, has led to the formation of a special system of fertile shoots termed an inflorescence or, after the fruit is formed, an infruktescence. (See FLOWERS; FRUIT.) Such inflorescences are wanting or ill developed among the Gymnosperms, while in the Angiosperms they are often well differentiated, constituting unities of a higher order. The modifications exhibited by the fertile shoots of such an inflorescence are due, partly to a difference in their mode of branching, partly to the reduction or the metamorphosis of their leaves. These changes are the result of an adaption to pollination, in the endeavor to aggregate the flowers and at the same time render them more conspicuous by the reduction of the foliage-

leaves. Sometimes the whole system of fertile shoots is converted into an attractive apparatus, as in the *Araceae*, where the axis and the subtending leaf of the inflorescence have assumed the function, usually exercised by the perianth, of enticing insects. Viewed from a purely morphological standpoint, two types of inflorescences may be distinguished, the Botryose (racemose, monopodial) and the Cymose (sympodial).

Influenza, la grippe; an epidemic catarrhal fever, now believed to be due to a very minute bacillus that can be found in the various secretions. Epidemics of this disease have been traced back as far as the beginning of the 16th century, and since 1741 many such epidemics spreading over portions of Europe have been described. There are so many different types of the disease, and so many parts of the body may be distinctly attacked by it that it somewhat baffles close definition. The epidemics vary much in severity as well as in type. During the last decade it has become almost constantly present over portions of the United States, in some years being much worse than in others.

So great is the variation of its symptomatology that no standard description can be given, and the types are classified according to prominent features. After one to four days of incubation, the disease usually sets in abruptly with chilliness or true rigor; this is followed by a fever (which may be constantly low or may run very high), headache and general aching, and a degree of prostration out of proportion to any discoverable cause. The respiratory form is characterized by inflammation of the nasal, the pharyngeal, the laryngeal, the tracheal, and the bronchial membranes. Starting in the nasal mucous membrane, the inflammation is apt to involve the other membranes in the order given. It is quite common for the lungs to show small spots of bronchopneumonia. There is frequently nothing to distinguish such an influenza from similar acute catarrhs of the respiratory passages except the known presence of an epidemic and the disproportionate prostration. The gastrointestinal form is characterized by nausea, vomiting, abdominal pain and profuse watery discharge, with prostration sometimes amounting to collapse. The typhoid form is characterized by the sudden development of rather high fever (with or without severe aches and pains), general apathy, or even a low muttering delirium. The fever runs from a few days to two weeks, and may very closely resemble typhoid. The nervous form is characterized by severe pains throughout the entire body, prostration, moderate fever, but no definite affection of any part or organ. The meringeal form is characterized by headache, fear of light, pain and stiffness of the muscles of the back of the neck.

Complications and extension of the inflammation to other parts are common. Pneumonia complicating influenza is rather apt to be very severe, and in some epidemics the mortality rises very high. Pleurisy is quite common. Great disturbance of the heart's action is seen in some cases, and the poison may actually attack the lining membrane of its chambers. Less commonly there is inflammation of the eye, ear, brain, liver, intestine, or kidneys. The skin is sometimes affected, showing a general blushing rash, herpes (small painful itchy blisters), or bloody patches. A very common sequel is great

nervous depression, either an inability to make bodily or mental exertion or "low spirits," even amounting to true melancholia. Unless influenza is epidemic, differential diagnosis may be very difficult, but hasty refuge in a diagnosis of "grippe" is far too common; in doubtful cases search should be made for the specific bacillus and considerable reliance placed on the presence or absence of the characteristic symptom, extreme weakness.

For the disease there is no specific treatment; the infecting organism must continue to grow until the natural defenses of the body overcome it; as yet no means has been discovered of killing the bacillus in the body or overcoming its poisons by an antitoxin. Careful isolation of the affected individual will prevent the spread of the disease to other members of the family, and much can be done for the patient's relief. Useful measures consist in securing thorough action of the bowels, keeping up the nutrition by simple, easily digested foods, and the administration of drugs such as phenacetin, acetanilid, caffeine, and bromides to relieve the distressing pains or nervous tension. The nervous exhaustion which is apt to follow is best treated by a period of mental rest, nourishing diet, and little or no bodily exertion.

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Infor'mer, a person who sues for a penalty against those who have infringed any law or penal statute. To encourage the apprehending of certain felons, guilty of offenses not so much criminal as bordering on criminality, many English statutes, from 1692 downward, granted rewards to such as should prosecute to conviction. The penalty in whole or in part inflicted in the case of a successful conviction, and immunity from certain troublesome parish offices, were the inducements held out to informers. In many cases this practice has been resorted to in modern statutes. In the United States one who informs the government of the whereabouts of smuggled goods, counterfeit money, etc., is rewarded by a fee of ten per cent of the net value of the confiscated goods. In criminal law an informer is said to turn state's evidence (q.v.).

Infu'sion, in pharmacy, an aqueous solution of a medicinal substance obtained by treating with water, usually without the aid of boiling. The water may be either hot or cold, varying with the object to be obtained. According to the directions of the United States Pharmacopoeia, infusions are generally prepared by pouring boiling water upon the drug and macerating in a tightly closed vessel until the liquid cools. The active principles are in this manner extracted more rapidly and, as a rule, in much larger portions than if the solution is colder. Heat is not advisable if the active principles are volatile. If an infusion is desired of a greater degree of concentration than that obtained by the process of maceration, it is frequently prepared by percolation, in which operation the drug is sliced or broken up into small fragments, packed in a percolator, and the water, either hot or cold, is passed through. Infusions are sometimes made with the aid of other liquids than water, but this is the exception rather than the rule. Infusions do not keep well, and therefore they should be made extemporaneously and

in small quantities. In household medicine, infusions are very widely employed. These may be made at home or made by the pharmacist. It is essential to remember that if they are made in hot weather in large quantities they must be sterilized.

Infusion of saline solution into the blood-vessels is a very important procedure in medicine. It is employed largely in the treatment of shock, and in severe hemorrhage, especially following operations or childbirth. The solution that is used is known as a normal salt-solution, and consists of about one teaspoonful of common salt to a pint of water. This solution should be boiled carefully for one half to three quarters of an hour, the amount of evaporating water being made up as the boiling proceeds, and after being made it should be kept in large bottles provided with cotton plugs for stoppers. In severe cases of hemorrhage, infusion has often saved life, as it provides a body of fluid on which the heart and blood-vessels can act. The salt-solution is usually introduced into one of the large veins of the arm at a temperature of one to two degrees above that of the body-temperature. See BLOOD; TRANSFUSION.

Infuso'ria, Protozoa of the classes *Flagellata* and *Ciliata*, originally so-called from abounding in organic infusions. While the term is now restricted to the ciliate protozoans, it often includes the flagellate protozoans as well. The latter are represented by the monads. These are exceedingly minute round or pear-shaped animals, which move by one or two lash-like processes called flagella. They contain a nucleus and contractile vesicles. Some of them are fixed by a stalk, and are provided with a collar, as in *Codosiga*, out of which the flagellum projects. One of the simplest monads (*Heteromita*) is obtained by placing a cod's head in water at a temperature of about 70° F. In a few days the water will swarm with these monads. The young germs will live in boiling water, but perish at a temperature of from 212° to 268° F., while the adults are destroyed at 142° F.

In the ciliate infusoria the body is more or less flattened and covered with cilia (*Paramecium*, etc.). They have on the under side of the body a slightly defined mouth (or cytostome), which is permanently open, and the food is swept into it by the action of the cilia around it. The mouth leads into a funnel-shaped throat or cytopharynx, which ends in the protoplasm of the body. The food-particles swept into this throat and pressed into the protoplasm form a small enlargement which finally sinks farther in forming the "food vacuole," which, by the flow of the protoplasm, is carried about the body, while the digestible portions are absorbed and the waste matter is cast out at a fixed point,—a sort of vent (cytopype). The fresh-water forms have contractile vesicles, and in certain species the animal possesses so-called stinging rods (trichocysts), which are very minute and are placed vertically to the surface of the cortex; by some students they are supposed to be tactile rather than stinging structures. What correspond to the muscular fibres of the higher animals, cause the quick convulsive movements observed in these creatures. Two important organs are present in all ciliate in-

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fusoria, that is the nuclei. The larger nucleus (macronucleus) is an oval, rod-like or spiral body, which appears to control the processes of feeding and motion. The other nucleus (micro-nucleus) is much smaller and is concerned with reproduction. Reproduction occurs usually by self-division, and more rarely the infusorians contract into a ball and divide into spores, which grow to become adults. The periods of fission are at times interrupted by the process of conjugation, which only differs from sexual reproduction in the fact that two individual infusorians meet and fuse together and then separate, the result being a process of fertilization which leads to a complete new formation of the nucleus, and thus to a new organization of the animal. (For a more detailed account see Hertwig-Kingsley's 'Zoology' 1903).

The more specialized infusoria are *Stentor* and *Vorticella*. The former is large enough to be seen without a lens. It is purplish, and under the microscope shows itself to be a beautiful creature. It is trumpet-shaped, with a spiral tract of thicker cilia around the mouth-end. The most highly organized Infusoria are the bell-animalcules (*carchesium*, etc.), which are compound bell-shaped forms, forming colonies with forked branched stalks. The nucleus is sausage-shaped, and near it is the micronucleus. They form a white mass like mold on the stems and leaves of aquatic plants. Some of the infusoria are parasitic in the digestive and circulatory organs of the higher animals. Many of the species are cosmopolitan; this is due to their great vitality, since they may dry up, and their bodies float about in the air in wind currents, and thus conveyed over the earth, reviving again when falling into the water. Consult: Stein, 'Organismus der Infusions-Thiere' (1859-83); Saville Kent, 'Manual of the Infusoria' (1880-2); M. Hartog, 'Protozoa' (Vol. I., Cambridge Natural History, 1903); Ray Lankester, 'Treatise on Zoology' (1902); Hertwig-Kingsley, 'Zoology' (1903).

In'galls, John James, American lawyer: b. Middleton, Mass., 29 Dec. 1833; d. Las Vegas, New Mexico 16 Aug. 1900. He was graduated from Williams College in 1855, and was admitted to the bar in 1857. In 1858 he moved to Kansas and established a law practice there. He was secretary of the territorial council in 1860, and of the State senate in 1861, and in 1862 was elected a member of the senate. In 1873 he became a member of the United States Senate, and was re-elected in 1879 and 1885. He was always a strong supporter of the Republican policy, and gained a wide reputation as a public speaker. He was president pro tem. of the Senate from 1887-91. In 1891 he was again a candidate for senator, but was defeated by the Farmers' Alliance. From that time till his death he devoted himself chiefly to lecturing and writing.

Ingalls, Rufus, American soldier: b. Denmark, Maine, 23 Aug. 1820; d. 15 Jan. 1893. He was graduated from West Point in 1843, fought in the Mexican War and in the Civil War, serving with distinction in the Army of the Potomac. He became quartermaster-general of the United States army in 1882 and was retired in 1883.

Ingelow, In'jé-lō, Jean, English poet and novelist: b. Boston, Lincolnshire, 1820; d. Ken-

sington, London, 20 July 1897. Her first published work appeared anonymously in 1850 under the title 'Rhyming Chronicle of Incidents and Feelings.' It was followed by 'Allerton and Dreux: or the War of Opinion' (1851), a story, and 'Tales of Orris' (1860); but not till the publication of 'Poems,' in 1863, did Miss Ingelow become famous. This volume won the enthusiastic praise of critics and the instant approval of the public, and passed through 23 editions. The most widely appreciated poems in it are 'The High Tide on the Coast of Lincolnshire'; 'Songs of Seven'; 'Divided'; and 'Supper at the Mill.' Later volumes were: 'Studies for Stories' (1864); 'Stories told to a Child' (1865); 'A Story of Doom, and Other Poems' (1867); 'Mopsa the Fairy' (1869); 'Off the Skelligs' (1872), her first long story; 'The Little Wonder Horn' (1872), a new series of stories told to a child; 'Fated to be Free' (1875); 'Sarah de Berenger' (1880); 'Don John' (1881); and 'John Jerome' (1886). A third volume of verse, 'Monitions of the Unseen' was published in 1885. Her works have been even more popular in America than in her native country.

Ingersoll, ing'gér sól, Charles Jared, American statesman, lawyer, and author: son of Jared Ingersoll (q.v.); b. Philadelphia 3 Oct. 1782; d. there 14 May 1862. After finishing his collegiate course he studied law, was admitted to practice, traveled in Europe, and became attached to the American embassy to France. In 1812 he was elected to Congress, taking his seat in May 1813. In 1815 he was appointed United States district attorney for Pennsylvania, an office which he held until 1829. Shortly after he was elected to the legislature of Pennsylvania. He was a member of Congress 1841-7 as representative of one of the districts of which the county of Philadelphia was then composed. He was the author of the poems 'Chiornara' (1800), and 'Julian' (1831); and of 'Inchiquin—the Jesuit's Letters on American Literature and Politics' (1810); 'Historical Sketch of the Second War between the United States and Great Britain' (1845-52); etc. Consult Meigs, 'Charles Jared Ingersoll' (1896).

Ingersoll, Ernest, American naturalist: b. Monroe, Mich., 13 March 1852. He studied at Oberlin College and in the Lawrence Scientific School and Museum of Comparative Zoology of Harvard University, where he was a pupil of Agassiz, and in 1874 and 1877 was connected as naturalist with the Hayden survey. He was also an expert on the United States fish commission, and later became known as a popular writer and lecturer on scientific subjects. In 1901 he was lecturer in zoology at the University of Chicago. Among his works are: 'Nests and Eggs of North American Birds' (1880-1); 'Oyster Industries of the United States' (1881); 'Knocking 'Round the Rockies' (1883); 'Country Cousins' (1884); 'The Crest of the Continent' (1884); 'Down East Latch-Strings' (1887); 'Wild Neighbors' (1897); 'The Book of the Ocean' (1898); 'Nature's Calendar' (1900); and 'Wild Life of Orchard and Field' (1902); and also 'The Ice Queen,' and several other popular juvenile tales.

Ingersoll, Jared, American lawyer: b. Connecticut 1749; d. Philadelphia 21 Oct. 1822. Having been graduated at Yale College in 1766,

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he went to London, was entered of the Middle Temple, and passed five years in the study of law. The American Revolution breaking out while he was still in London, he espoused the cause of the colonies, although the son of a loyalist. He went from London to Paris, where he remained for 18 months, making the acquaintance of Franklin. Returning home, he took up his residence in Philadelphia, where he won almost immediately a prominent position as a lawyer. In 1787 he was chosen one of the representatives of Pennsylvania in the convention which framed the United States Constitution. Twice attorney-general of the State, he was United States district attorney for Pennsylvania, and was in 1812 the federal candidate for Vice-President of the United States.

Ingersoll, Robert Green, American lawyer, lecturer and author: b. Dresden, N. Y., 11 Aug. 1833; d. Dobb's Ferry, N. Y., 21 July 1899. He received a common school education and was admitted to the bar in 1854. He soon became prominent in the courts and in Democratic politics. In the Civil War he recruited the 11th Illinois cavalry and entered the army as its colonel. On 29 Nov. 1862, while trying with a force of 600 men to intercept a Confederate raiding party he was captured by a force of 10,000 men, but was soon paroled and given command of a camp in St Louis. He soon afterward resigned. After the war he became a Republican, and was made attorney-general of Illinois in 1866. He was a delegate to the Republican National Convention in 1876 and placed in nomination for President, James G. Blaine, whom he termed "the plumed knight." His nominating speech gave him national reputation as an orator, and he afterward lectured frequently. He was an agnostic, and in his lectures attacked the Bible and the beliefs of the Christian religion. He was prominent in politics for several years, and had he not given such frequent expression to his agnostic views he would doubtless have been honored with high offices. He took up his permanent residence in New York city in 1882 and practised law there till his death. His most famous lectures include "Some Mistakes of Moses"; "The Family"; "The Liberty of Man, Woman, and Child"; "The Gods"; and "Ghosts". His publications include "Lectures Complete" (1886); "Prose, Poems and Selections" (1888); and "Great Speeches" (1887); "Mistakes of Moses" (1879). A complete collection of his works was published in 1900.

Ingersoll, Canada, town in Oxford County, Ont., on the Thames River and the Grand Trunk railroad, 19 miles northeast of London. It has newspapers, banks, a number of churches, and varied industries. Lumber and grain are among its larger exports, and it has manufactures of iron products, machinery, agricultural implements, woolen goods, woodenware, and cheese. Pop. (1901) 4,572.

Ingham, Charles Cromwell, American painter: b. Dublin, Ireland, 1797; d. New York 10 Dec. 1863. He was a pupil of William Cuning at the Dublin Academy, came to New York in 1817, was there a founder of the National Academy of Design (1826), and its vice-president in 1845-50. He became well known as a portrait artist, and De Witt Clinton, G. C.

Verplanck, and Lafayette were among his subjects. His further works include: "Day Dreams"; "The White Plume"; "The Death of Cleopatra."

Ingla, ing'la, Charles, American Anglican bishop: b. New York 1734; d. Halifax, Nova Scotia, 1816. He was ordained priest in England, and in 1765 became assistant minister at Trinity Church, New York. A stout loyalist, he refused to omit from the service the prayer for the king and royal family, and upon the occupation of New York by Washington retired for a time to Long Island. In 1777 he was chosen to the rectorship of Trinity, and in 1783, at the evacuation of New York by the British, went to Halifax in the emigration of the United Empire loyalists. He was consecrated in 1787 bishop of Nova Scotia (with jurisdiction over the other North American provinces), and was the first missionary bishop of the Church of England. He published sermons and pamphlets.

In'got, a small bar of metal formed by casting it in molds. The term is chiefly applied to the bars of gold and silver intended for coining.

Ingraham, ing'grā-am, Duncan Nathaniel, American naval officer: b. Charleston, S. C., 6 Dec. 1802; d. there 16 Oct. 1891. He entered the navy as midshipman in 1812, and became a captain in 1855. While in command of the sloop of war St. Louis he arrived at Smyrna 22 June 1853, and was informed that Martin Koszta, Hungarian by birth, but entitled to the protection of the United States, was a prisoner on board the Austrian brig of war Hussar, then lying near the St. Louis. Ingraham went on board the Hussar, had an interview with Koszta, and learned that he had resided a year and 11 months in New York, where he took the usual oath of allegiance to the United States in July 1852, and was in possession of a legalized copy of a declaration of his intention to become an American citizen; that he had come to Smyrna from New York on business; that on the afternoon of 21 June he was seized by a party of armed Greeks, employed by the Austrian consul-general, carried on board the Hussar, where he was held in close confinement. Ingraham accordingly, on 2 July, at 8 A.M., demanded of the Austrian commander the release of Koszta by 4 P.M., declaring that he would otherwise take him by force. At 11 o'clock the Austrian consul-general proposed to deliver Koszta into the hands of the French consul, to be held by him subject to the disposition of the consuls of the United States and Austria, and not to be delivered without their joint order. As this proposition gave sufficient assurance of the personal safety of Koszta Ingraham accepted it, and the Hungarian was set at liberty. The conduct of Ingraham was fully approved by the government, and Congress by joint resolution, 4 Aug. 1854, requested the President to present a medal to him for his conduct on this occasion. In 1860 he resigned from the United States navy, entered the Confederate service and became a commodore.

Ingraham, Joseph Holt, American novelist: b. Portland, Maine, 1809; d. Holly Springs, Miss., December 1866. After brief experience

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of mercantile life he became teacher in Washington College, Natchez, Miss., and in 1836 published his first book, 'The South-West, by a Yankee.' Thenceforth he produced in rapid succession 'Lafitte'; 'Burton, or the Sieges'; 'Captain Kyd'; 'The Dancing Feather'; and other romances of small literary merit, some of which attained a large circulation. He subsequently entered the Episcopal ministry and was rector of a parish and of St. Thomas's Hall, an academy for boys, in Holly Springs, Miss. He still continued to write, publishing 'Prince of the House of David' (1855) and the 'Pillar of Fire' (1859); 'The Throne of David,' which were widely popular, but nearly worthless from a literary point of view.

Ingraham, Prentiss, American soldier and author: b. Adams County, Miss., 22 Dec. 1843. He was educated at Jefferson College (Miss.), also studied medicine at the Mobile Medical College, entered the army of the Confederate States in 1861, fought later with Juarez in Mexico, with the Austrian army in the war with Prussia, and in the ten-years' war for independence in Cuba. Subsequently he entered a literary career, and published a great quantity of fiction, including: 'Without Heart' (1878); 'Zuleikah' (1887); 'Red Rovers on Blue Waters' (1890); 'The Vagabond' (1891); and 'The Wandering Jew of the Sea' (1891).

In'gram, John Kells, English educator and author: b. County Donegal, Ireland, 7 July 1823. He was educated at Trinity College, Dublin, and was appointed professor of oratory and English literature there in 1852, Regius professor of Greek in 1866, and librarian in 1879. At one time he was vice-provost of the college, and also held the presidency of the Royal Irish Academy. His 'History of Political Economy,' originally printed in the 9th edition of the 'Encyclopædia Britannica,' was separately published in 1888 and widely translated. He further wrote: 'A History of Slavery and Serfdom' (1895); 'Sonnets and other Poems' (1900); 'Human Nature and Morals according to Auguste Comte' (1901), and other works.

Ingres, Jean Dominique Auguste, zhōn dō-mē-nék ö-güst äng-r, French historical painter: b. Montauban 15 Sept. 1781; d. Paris 14 Jan. 1864. Placed in the school of David he made such rapid progress that at 20 he had gained in two successive years the first and second prizes of the Academy of Fine Arts. In 1806 he departed for Italy, where he passed nearly 20 years, abandoning, under the influence of a close study of Raphael and the old masters, the 'dry, classic style acquired from David. His works are numerous, and comprise generally serious historical and classical subjects; in the great exhibition of 1855 at Paris an entire salon was appropriated to them. Many are in the Louvre, on the ceiling of one of the apartments of which is painted his 'Apotheosis of Homer.' He painted the portraits of many distinguished personages, from Napoleon I. downward. The art of Ingres is adjudged to hold a middle place between the classic and the romantic schools.

Inhalation, in medicine, a mode of applying remedies directly to the respiratory tract.

Either steam alone, steam charged with drug-vapors, or drugs finely subdivided in sprays, are breathed into the air-passages as deeply as possible. This method of medication is useful only in relieving inflammations of the upper air-passages and possibly the trachea and larger bronchi. The air in the smaller bronchi is not changed by breathing, but by the diffusion of gases, so that substances in aerial suspension are deposited on the surface before reaching the smaller divisions of the bronchial tubes. Steam does not penetrate far, but is cooled, and deposits moisture as far as the trachea. The old-fashioned croup-kettle and many devices for carrying out the same idea are used for the first stages of laryngitis. Many substances, such as tincture of benzoin, etc., are added to the boiling water, but render it no more efficacious. Instead of conducting the steam directly to the mouth and nose by a funnel or tube, it may be well to place the patient in a simply enclosed tent, formed of bed-clothes, and to allow the steam to charge the confined air. This method is particularly advisable for infants and older children.

Inher'itance, in law, a perpetual or continuing right to an estate invested in a person and his heirs. There are nine "canons of inheritance"; three may be quoted: (1) That inheritance shall, in the first place, descend to the issue of the last purchaser in *infinitum*; (2) That the male issue shall be admitted before the female; (3) That where two or more of the male sex are in equal degree of consanguinity to the purchaser, the eldest only shall inherit, but the females all together.

Inheritance Tax, an assessment laid upon those made heirs of property, either by distribution or descent. Sometimes this assessment is confined to collateral heirs, when it is called collateral inheritance tax. The raising of public funds in this way has been sanctioned by legislation from the beginning of Roman law, and in England and other countries is a large and steady source of revenue, although such taxes have been stigmatized by certain economists as "death duties." During the Civil War taxes of this kind were made part of the internal revenue system of the United States, but abolished soon after the struggle ended. The rate and method of assessment vary in different countries, and in different States of the Union. The English inheritance tax ranges from a 1 to a 10 per cent assessment, in accordance with the amount of the inheritance and the degree of relationship of heirs. In the United States lineal, collateral and succession inheritance taxes have been instituted in several States, as a source of domestic revenue. In Connecticut the assessment on inherited property is 5 per cent on all sums and values above \$1,000. In Delaware the assessment ranges from 1 to 5 per cent, according to the amount of property left, and the degree of relationship. In Illinois, 1 per cent on values over \$20,000 to lineal descendants; 2 per cent to 5 per cent on all amounts to collateral relations. In Maryland, 2½ per cent on all legacies and successions. In New York, 1 per cent on all property over the amount of \$10,000 to lineal heirs, 5 per cent on all amounts over \$500 to collateral relatives. In Ohio, 5 per cent on all values over \$500. In

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Virginia, 5 per cent in every case. Several States leave untaxed the property descending or distributed to the lineal descendants, and place assessments of varying percentage on the amount or value of the legacy which falls to collateral heirs. These are California, Maine, Massachusetts, Minnesota, New Jersey, Tennessee, West Virginia. Inheritance laws have in the United States occasioned much discussion and litigation, but their justice and utility have been testified to by experience and the decision of the law courts. The leading economists of the present and the other periods have seen the scientific propriety, even necessity, of such legal provisions, and have noted the uniformity with which they deal with all classes of the financial community.

In'ia, a genus of toothed cetaceans similar to dolphins, but placed on structural grounds in the allied family *Platanistidæ*, with the freshwater dolphins of the Ganges and the La Plata. The single species (*I. gressensis*) is called boutu and tucuxi, and is found in some of the upper tributaries of the Amazon, and in the lakes near the Cordilleras. It measures about eight feet in length, has a long cylindrical snout with stiff hairs, and a very slight dorsal fin. It feeds chiefly on fish, and is hunted for the sake of its oil.

Injunc'tion, a writ issued by a court of equity, bidding, or forbidding, a person or persons to do a certain thing. The injunction originated in Roman law, and was anciently known as an interdict, a name it still bears in Scottish practice. It was introduced as a remedy for some of the abuses of common law, and as a preventive, when evasion of common law provisions seemed possible. It is to-day one of the most potent of the legal remedies of an equitable character which stand on the statute books.

There are three main divisions in the purposes for which a writ of injunction is issued. A writ may be prohibitive, protective, or restorative. In the first place it may forbid the commission of certain acts of a civil nature which are charged with injustice. Second, it may be so framed as to protect such civil rights of an individual or a corporation as seem to be threatened. Third, it may order the restitution or restoration of such rights as have unlawfully been taken away from an individual or a corporation. These characters of the writ have been clearly expounded by Blackstone, as follows:

"This writ may be had to stay proceedings at law, whatever stage they may have reached; to restrain alienations of property *pendente lite*, and tenants for life and others having limited interest from committing waste. It may be granted to restrain the negotiation of bills of exchange, the sailing of a ship, the transfer of stock, or the alienation of a specific chattel, to prohibit assignees from making a dividend, to prevent parties from removing out of the jurisdiction, or from marrying, or having any intercourse, which the court disapproves of, with a ward. The infringement of a copyright or a patent frequently calls for the exercise of this beneficial process; which may also be had to restrain the fraudulent use of trade marks, or of the names, labels, or other indicia of the makers or vendors of goods and merchandise,

and in a large class of cases, far too numerous to be mentioned here."

The first two kinds of injunction are most commonly used, and a familiar example of the prohibitory writ is that which orders the abatement of a nuisance. A railroad which lays tracks without first gaining the right of way may be compelled by injunction to remove them. By such a writ patent rights, copyrights and trade marks are secured from infringement, or proceedings in a court of law are stayed. Sometimes a court of equity issues an injunction prohibiting litigants within its own jurisdiction from prosecuting a suit in another jurisdiction; for example, a United States court may restrain creditors for suing in State courts for the enforcement of their claims against a bankrupt, and reserve the disposition of his estate to its own jurisdiction. A court of equity only issues a writ of injunction when a remedy of law appears inadequate to give the wronged party the complete relief to which he is entitled. Thus in recent cases the courts have issued writs forbidding labor agitators and others from inducing or coercing workingmen, in such a way as to bring on a strike to the injury and damage of employers, who might thus be induced to sacrifice their rights in order to escape ruin or irreparable loss.

An injunction in the United States may be preliminary or perpetual. A preliminary writ is sometimes styled interlocutory, as it is issued *pendente lite*. The preliminary writ may be made perpetual, if, after arguments made and heard, the court decides that the grounds advanced for the continuance are valid, and have been so proved by evidence. Failure to obey an injunction is punishable as a contempt of court (q.v.) Consult Beach, 'Treatise on the Law of Injunctions' (1895).

Injunction, Government by. See GOVERNMENT BY INJUNCTION.

Injunction, Theatrical, a term applied to a mandate issued by a court of equity, to compel or prevent the performance of some act for which money damages would not properly compensate the injured party. Relief by injunction in matters pertaining to theatricals is probably more frequently sought than in any other business or profession, and precedents in law established in this class of cases has become of considerable importance. At first, courts of this country and England refused to grant injunctions against actors for the purpose of compelling them to perform their contracts, a learned justice saying: "The Court could not regard as law the old adage that 'a bird that can sing and will not sing must be made to sing.'" But latterly, when the service of an actor became recognized and it was made to clearly appear that an actor or singer, by intelligence, education and other artistic accomplishments and talents, was of extreme importance to one who had invested money in the production of a play or opera, it was held that a court of equity would by injunction enforce a covenant in a contract. But this has simply gone to the extent of compelling a fulfilment of the contract, or forcing the artist to remain idle during its term. The services of every actor will not be enjoined. He must actually possess some exceptional merit, so that his services may be

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termed special, unique and extraordinary, and it must be shown they cannot be fulfilled by any other person without injury to the employer. In the case of *Lumley v. Wagner*, the courts of England enjoined Johanna Wagner, a prominent prima donna of the early 50's from appearing at Covent Garden Opera House, London, in violation of her contract with Lumley; and then for the first time the British courts asserted their authority over contracts of actors, and granted an injunction forbidding her rendering professional services for any but her original employer.

In the United States, the Federal courts recognized the right of a manager to have the exclusive services of his employee, and in *McCall v. Braham* an injunction was granted which prevented Lillian Russell from violating her contract. In the State courts, the case of *Augustin Daly v. Fanny Morant Smith* (49 How. Pr. 150), Superior Court Justice Freedman also appreciated the fact that the ancient rule had been abrogated and the modern one compelling actors to live up to their agreements, as other individuals, was there enforced. The contract must unquestionably be fair. The rights of both parties to it must be equal. In other words, if the contract gives the manager the right to terminate it by giving notice before the expiration of the contract, a like right of termination must also be given the actor; and as stated before, the actor's services must be special, unique and extraordinary. In this latter connection, it seems uncertain where to draw the line. In the case of *Carter v. Ferguson* the court refused to grant an injunction to Mrs. Leslie Carter against William J. Ferguson, an actor, saying that his services were not so special and unique as to warrant a court of equity's interference. In *Charles Hoyt v. Loie Fuller*, the court granted an injunction against the dancer, holding that a serpentine dance in the performance of which she became famous, warranted the court's interference by injunction. In *George Edwards, the London manager, v. Cissie Fitzgerald*, the New York Supreme Court granted an injunction against Miss Fitzgerald, on the theory that a certain wink of her eye used in a play was of special merit, and a drawing card. In *Harris v. Sparks*, an injunction was granted against John Sparks, the Irish comedian, the ground being that his portrayal of an Irish character was special, unique and extraordinary. While in the still later case of *Shubert Brothers v. Aimee Angeles*, imitations given by the performer were considered so special, unique and extraordinary as to warrant the granting of an injunction. Each case, however, must be determined by its own peculiar circumstances. In the most recent case—*Harrison Grey Fiske v. Tyrone Power*—the court refused to grant an injunction against Tyrone Power, although his ability as an actor was exploited in the newspapers; on the ground that his services were not so special, unique and extraordinary, as to justify an injunction. But in guarding the rights of an actor, the courts will see that no advantage has been taken of him by the manager, and that the manager for whom he is to perform is of such financial responsibility as to insure the salary of the actor. In the case of *Rice v. D'Arville*, Edward E. Rice,

the theatrical manager, sought to restrain Camille D'Arville from performing for others; but on the defense that Rice was insolvent and indebted to her on a previous contract, Justice Oliver Wendell Holmes, then of the Massachusetts Supreme Court, would not compel her to perform for Rice.

Injunctions in the theatrical profession are not confined to actors and actresses, but are often invoked to prevent the piracy of a play or the use of a name. Where a play, or a scene from a play, has been copyrighted, the Federal courts alone have jurisdiction of the matter, and will by injunction prevent anybody from performing or producing it as their own. When there has been no copyright the common law protects the work, so well as its title; and the use of a similar name, or a name which is apt to deceive the public into the belief that it is the one already used by an author, will likewise be enjoined. A recent instance is the case of *Charles Frohman v. Arthur Fraser*, where the use of the title "Sherlock Holmes" was enjoined, this name having been adapted by William Gillette as the title of a play, notwithstanding the name had been used by A. Conan Doyle as the title of his novel. In that case the court held that Mr. Gillette having first used the name in connection with a theatrical production was entitled to all emoluments arising from it. Notwithstanding the numerous attempts to avoid the principles of law applicable to this class of cases, it matters not whether it is the actor who is involved or the theatrical manager, the American courts are humane, equitable, just and careful, and invariably zealously guard the interests of those engaged in the theatrical profession, so well as those engaged in any commercial business.

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Ink, a colored liquid used for writing and printing. They are of various classes, as writing and copying, black or colored, India, printing and lithographing inks.

For long ages past the best black writing-ink has been made by mixing together solutions of nutgalls and of ferrous sulphate of iron, known as green vitriol, and holding in colloidal suspension, by aid of a gum, the colored substance produced. The gallo-tannic acid present in a freshly prepared solution of gall, upon exposure to the air, changes gradually largely into gallic acid, and the protoxide of iron changes into peroxide. The color of this changed product is much deeper than that of the original mixture. It has been found that the permanency of the writing is greater if the ink is used before this conversion is fully completed. The change is held in check by having present in the ink a slight amount of some free volatile acid such as hydrochloric. The trace of acid also serves to hold the iron color in the state of colloidal suspension or solution. The moulding to which such an ink is liable is checked by adding to it a trace of some antiseptic, such as carbolic acid. All known commercial substitutes hitherto used for nutgalls in black writing-ink produce a fluid somewhat inferior to that from nutgalls.

An exhaustive scientific investigation of the chemistry of ink to determine the best ingre-

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dients and the proportions to be used of the same for the producing of the most permanent black writing-ink has been made in Germany by Osw. Schlüttig and Dr. G. S. Neumann, and published in their work on 'Die Eisengallustinten,' issued by Zahn & Jaensch of Dresden in 1800. Their conclusions were followed in preparing the specifications for the official "Standard Record Ink" required under the laws of Massachusetts to be used on all the public records in that state. The same specifications have since been adopted by the U. S. Treasury for the ink used in that department. This ink has also been adopted by the Danish government for its official records. The specifications, which were prepared by Dr. Bennett F. Davenport of Boston, as ink expert for the State of Massachusetts, it is to be noted are for the required quality of the ink, and not for the compounding of it. The specifications are as follows:

It must be a gallo-tannate of iron ink, not inferior in any essential quality to a typical standard for comparison which has been properly prepared after the following formula, in which all the ingredients are of the quality prescribed by the United States Pharmacopeia, and the per cent of true acid present in the sample of tannic acid used has been determined by the Loewenthal and Schroeder method.

Take of pure, dry Tannic Acid, 23.4 parts by weight; crystal Gallic Acid, 7.7 parts; Ferrous Sulphate, 30.0 parts; Gum Arabic, 10.0 parts; diluted Hydrochloric Acid, 25.0 parts; Carbolic Acid, 1.0 part; Water, sufficient to make up the mixture at the temperature of 60° F. to the volume of 1000. parts by weight of water.

Inks submitted will be subjected to the following tests, as compared with the typical normal standard ink described above: (1) A fluid ounce allowed to stand at rest in a white glass vessel, freely exposed in diffused daylight for two weeks to the light and air, at a temperature of 50° to 60° F., protected against the entrance of dust, must remain as free from deposit upon the surface of the ink or on the bottom or sides of the vessel. (2) It must contain no less iron, and must have a specific gravity of 1.035 to 1.040 at 60° F. (3) It must develop its color as quickly. (4) After a week's exposure to diffused daylight the color must be as intense a black when used upon the standard record paper, and it must equally resist changes from exposure to light, air, water, or alcohol. (5) It must be as fluid, flow as well, strike no more through the paper, nor remain more sticky immediately after drying.

To such an ink a slight amount of some one of the water soluble coal-tar colors is usually added to give the desired initial color to the ink when used in writing.

Cheaper grades of black writing-ink are produced by substituting for the nutgalls other tannin containing substances, or by using logwood. In these other iron salts, or salts of other metals are sometimes used, as of copper, aluminum or chromium. For special purposes some of these have certain advantages. For copying, for instance, the ink made from logwood with alum cake and chromate has the highest efficiency known. This ink, however, fades out after a few years' exposure to the open air and daylight.

Within modern times colored liquid solutions have come much into general use as inks, made up with aniline and other dyestuff colors. They are easily and cheaply made, flow nicely from the pen, and allow of a great variety as to choice in coloring, but none of them have the permanency of the ancient nutgall iron ink on exposure to light and air.

The usual basis of commercial marking inks, for use on textile fabrics, is some salt of silver. The permanent color of this ink is developed through the action of light, heat or some chemical, after the ink has been applied. The usual basis of India ink is an exceedingly finely di-

vided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by being ground up with water. The usual base used for printers' ink is a linseed-oil varnish. To this the desirable color is imparted by the use of lampblack, or some other coloring substance.

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Inkberry, or Winterberry, a shrub (*Ilex glabra*) of the holly family which grows upon the Atlantic coast of the United States. It is a fine evergreen, two to four feet high. Its stems are slender and flexible, and its leaves, about an inch in length, are lanceolate in form, of leathery texture, and present a shining upper surface. It bears small, very black berries. Formerly its bark and leaves were used medicinally, especially in fevers. For bouquets and decorative purposes it is much valued, and finds a ready market in large Eastern cities.

Inkerman, īnk-ēr-mān', Russia, a village on the site of a ruined town in the Crimea, at the head of the harbor of Sebastopol, 35 miles by rail southwest of Simferopol. It gives its name to the sanguinary battle fought on the heights overlooking the town, on 5 Nov. 1854, when the Russians unexpectedly attacking the British camp were repulsed with great slaughter, losing in killed 3,000 and in wounded 6,000, the loss of British and French allies being 850 killed and 3,500 wounded.

Inlaying is the art of ornamenting flat surfaces of one substance by inserting into them pieces of some other substance. Various kinds of metal or wood, or pearl, ivory, etc., are employed in this process, which is now applied chiefly to the production of ornamental articles of furniture. When wood of one color is inlaid with others of different colors, as in ornamental devices in flooring, it is generally called marquetry, the various pieces of wood being usually disposed in regular geometrical figures. The art of inlaying iron or steel with other metals, as gold or silver, is called damascening. Buhl and reisner work, once highly prized, have lost much of their celebrity. The former took its name from Buhl, an Italian resident in Paris in the reign of Louis XIV., and the latter was designated after Reisner, a German who not long after settled in the same city. Buhl for the most part inlaid brass on tortoise-shell, Reisner a dark wood on a tulip-wood ground. The usual instrument for cutting out veneers for inlaying is a fine saw, mounted in a bow or arched handle, and worked in short quick movements. Three or four veneers are sometimes cut simultaneously in this way. Inlaying with stone, in which the Florentines have long excelled, is called *pietra dura*, and differs from mosaic in having the holes not cut through the ground, which is commonly of black marble, but only to a regulated depth.

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The best work of this kind is now produced at St. Petersburg, the art being stimulated by encouragement from the Russian government. An Indian variety of inlaying, in which the inlaid metal occupies more of the surface than that which forms the ground, is called *Kuftgari*; and in another variety, *Tutenague* or *Bederywork*, small pieces of silver are hammered into spaces previously cut in the ground, which consist of one part of copper to four of pewter, and is thus both hard and easily cut. See MOSAIC.

In'man, Henry, American artist: b. Utica, N. Y., 20 Oct. 1801; d. New York 17 Jan. 1846. From early boyhood he manifested a taste for art, and in 1814 Jarvis, the portrait painter, offered to receive him as a pupil, and he was bound an apprentice for seven years. Upon the conclusion of his apprenticeship he devoted himself to portrait painting. Among his most characteristic portraits are those of Chief Justice Marshall and Bishop White. He painted also landscape, genre, and history. In 1844 he visited England, where he was the guest of Wordsworth, whose portrait he painted, and at whose suggestion he executed his 'Rydal Water,' near the poet's residence. During his residence in England he also painted portraits of Dr. Chalmers, Lord Chancellor Cottenham, and Macaulay.

Inn, a river of Europe which issues from a lake at the foot of the Rhætian Alps, flows northeast through the deep and narrow valley of the Engadine, in the Swiss canton of the Grisons, enters the Tyrol at Martinsbruck, passes Innsbruck, Hall, and Kuffstein, and shortly after enters Bavaria. At Muhldorf it turns east till it receives the Salza, where it begins to form the boundary between Austria and Bavaria, and joins the right bank of the Danube at Passau, after a course of over 300 miles.

Inn and Innkeeper. In Great Britain inns are houses where travelers are furnished, for the profit of the provider, with everything they have occasion for while on their journey, and may be set up without license by any person, provided he refrains from selling excisable liquors, which of course require a license. Hotels, public-houses, taverns, victualing-houses, and coffee-houses are all inns when the keepers of them make it their business to furnish travelers with food and lodging; otherwise they are not. In the United States there are no inns, but hotels in cities and taverns in rural districts. See HOTELS IN AMERICA; TAVERNS.

Innate Ideas, certain notions or conceptions declared by many philosophers to be given to the mind of man when he first receives conscious being. Their existence has been much disputed by philosophers. The term innate, as applied to ideas, was first used by Descartes. As his definition failed in precision, the doctrine of Descartes was assailed by Hobbes and Locke. As afterward more strictly stated by himself, his views were as follows: An innate idea is not one that presents itself always to our thought, for there could be no such idea; but we have within ourselves the faculty of producing it. He has nowhere given an enumeration of the ideas that he considers innate, though he attaches particular importance to that of infinity, which he makes the foundation of his proofs for

the existence of God. What the followers of Descartes designate innate ideas, those of Cousin term universal, necessary and absolute. Some of the greatest names in European philosophy are associated with the discussion of this theory, or of cognate theories, as Clarke, Newton, Malebranche, Kant, etc.

Innes, In'ës, Alexander Taylor, Scottish jurist: b. Tain, Ross and Cromarty, Scotland, 18 Dec. 1833. He was educated at Edinburgh University, was admitted to the Scottish bar in 1870, appointed advocate-depute in Scotland in 1881, and served under later Liberal governments. Among his works are: 'The Law of Creeds in Scotland' (1867); 'Church and State: A Historical Handbook' (1890); 'Studies in Scottish History' (1892); a life of Knox in the 'Famous Scots' series (1896); 'The Trial of Jesus Christ' (1899); and 'The Law of Creeds' (1902).

Inness, George, American painter: b. Newburg, N. Y., 1 May 1825; d. Bridge of Allan, Scotland, 3 Aug. 1894. His art education began in boyhood and when 16 years of age he learned map engraving. He first attempted nature sketching in 1843, when he showed such promise that he was admitted into the studio of Regis Gignoux, New York; but soon opened a studio for himself and through the liberality of a patron was enabled to visit Europe. After spending 15 months in Italy and one year (1850) in France he finally made his home at Eagleswood, near Perth Amboy, N. J. He is looked upon as the first among American landscape painters, and was not only a clever and imaginative interpreter of the scenery among which he lived, but a man of intellect, a thoughtful yet bold theorist on art subjects and an incisive critic. He had a keen appreciation of American scenery, and the sky and atmosphere of the eastern States were sympathetically portrayed with an earnestness that recalls the sentiment of the Fontainebleau-Barbizon school. His early paintings are distinguished by conscientious care for detail, vivid perception of color, and the panoramic breadth of a bold and unconventional originality. After 1878 his style had ripened, and his technique grew simpler and less highly elaborated. He was willing to sacrifice all cleverness of touch in handling detail for the sake of portraying the emotion, or transitory effect of light and cloud in a landscape, the perturbation of storm or wind, the pageant of sunset, or the magic calm of a moonlight scene. In such productions his command of color was very remarkable. His pictures are much prized by connoisseurs, and when offered for sale command high prices. Five of them are in the Metropolitan Museum of Art, New York. Among the finest are: 'Under the Greenwood'; 'Close of a Stormy Day'; 'Pine Groves of Barberini Villa'; 'An Autumn Morning'; 'Autumn Gold'; 'The Edge of the Forest'; 'Passing Storm'; 'Moonrise'; 'Winter Morning, Montclair, New Jersey.'

Inness, George, Jr., American painter: b. Paris, France, 5 Jan. 1854. He is the son of George Inness (q.v.), the landscape painter. He was a pupil of the elder Inness at Rome in 1870-4, of Bonnat at Paris in 1875, began to exhibit at the National Academy in 1877, and became a member of the National Academy of

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Design in 1899. In 1899 he obtained a gold medal at the Paris Salon. His manner is forcible, and skilful in color. His work includes landscapes and animal subjects, among them: 'The Pride of the Dairy' (1878); 'Pasture at Chemung'; 'A Mild Day' (1887); and 'Morning on the River' (1902).

In'nocence. A wildflower. See HOUSTONIA.

In'nocent, the name of thirteen popes, as follows:

Innocent I. **Saint:** b. Albano; d. 12 March 417. He succeeded Anastasius I. as Bishop of Rome in 402. He supported Saint Chrysostom (q.v.) when the latter was driven from his see of Constantinople through the machinations of the Empress Eudoxia. Rome was pillaged by Alaric in 410, during his pontificate. He is commemorated by the Roman Catholic Church on 28 July.

Innocent II. (**GREGORIO DE' PAPI**, or **PAPARESCHI**, grā-gō-rē'ō dā pā-pē pā-pā-rē-kē): b. Rome; d. 23 Sept. 1143. He was elected pope in 1130 by a part of the cardinals, while the others elected Peter of Leon, who took the name of Anacletus. Innocent fled to France, where he was acknowledged by the Council of Etampes, by Louis VI, and soon after by Henry II. of England; also by the Emperor Lothaire, who conducted him in 1133 to Rome, where he occupied the Lateran, while Anacletus occupied the Castle of Crescentius, the Church of St. Peter, and a large part of the city and maintained himself against Innocent until his death in 1138. He held the second Ecumenical Council in the Lateran, which condemned Arnold of Brescia and his heresy, declared all the decrees of Anacletus null, and excommunicated Roger of Sicily, who had supported the latter. Roger, however, obliged Innocent to acknowledge him as king, absolve him from excommunication, and invest him and his heirs with Apulia, Calabria, and Capua.

Innocent III. (**GIOVANNI LOTHARIO CONTI**, jō-van'nē lō tha'rē ö kōn'tē): b. Anagni, Italy, 1161; d. Perugia, Italy, 16 July 1216. On the death of Celestine III. (1198) he was unanimously elected at the age of 37. Innocent, in the vigor of manhood, endowed by nature with all the talents of a ruler, possessed of an erudition uncommon at that time, and favored by circumstances, was better qualified than any of his predecessors to elevate the Papal power. By his clemency and prudence he gained over the inhabitants of Rome, obliged the imperial prefect to take the oath of allegiance to him, and directed his attention to every quarter where he believed that a Papal claim of property or of feudal rights existed. He concluded treaties with many cities of Tuscany for the mutual protection of their liberties and those of the Church, and soon obtained possession of the ecclesiastical states in their widest extent. He excommunicated Philip Augustus, king of France; laid the kingdom under an interdict in 1200 because Philip had repudiated his wife Ingeburga, and obliged the king to submit. He was still more decided in his treatment of John, king of England, who refused to confirm the election of Stephen Langton as Archbishop of Canterbury. Innocent laid the kingdom under an interdict, and in 1212 formally deposed him. John was finally obliged to sub-

mit, resigned his territories to Rome, and received them as a Papal fief from Innocent. All Christendom acknowledged the Pope's spiritual sovereignty; two Crusades were undertaken at his order, and his influence extended even to Constantinople. Innocent was one of the greatest Popes and rulers. It has been said of his rule, as of that of Gregory VII., whom he most resembles, that in those times the power of the Pope was salutary as a bond of union for Europe, in which the still firmer bond of a common civilization and knowledge did not, as at present, exist. In 1215 he held a council, the fourth Lateran and twelfth general which passed the decree making confession and communion obligatory at Paschal time. Frederick II. was acknowledged as German emperor, and the Franciscan and Dominican orders were confirmed.

Innocent IV. (**SENIBALDI DI FIESCHI**, sā-nē-bāl'dē dē fē ēs kē): d. Naples 7 Dec. 1254. He became Pope in 1243 and was perpetually at feud with the German emperor Frederick and his successors.

Innocent V. (**PETRO DI TARENTASIA**, pē-ä'trō dē tā-rēn-tā'sē-ä): b. 1225; d. Rome 22 June 1276. His pontificate lasted only from 20 January to 22 June of the year 1276.

Innocent VI. (**ETIENNE D'ALBERT**, ä-tē-ĕn däl bär'): b. Brissac, France; d. 12 Sept. 1362. His pontificate extended from 1352 to 1362, and during this period the Papal residence was at Avignon.

Innocent VII. (**COSMO DE' MIGLIORATI**, kōs'mō dā mē-glō-rē-ătē'): b. Sulmona, Abruzzi, Italy, 1366; d. Rome 6 Nov. 1406. He was Pope from 1404 till his death, but was opposed by the antipope, Benedict XIII., who held his court at Avignon.

Innocent VIII. (**GIOVANNI BATTISTA CIBO**, jō-van'nē bät-tēs'ta chē'bō): b. Genoa 1432; d. 25 July 1492. He became Pope in 1484 and was for some time at war with Ferdinand of Naples and held the sultan Bajazet's brother Zelim a prisoner.

Innocent IX. (**GIOVANNI ANTONIO FACCHINETTI**, jō-van'nē än-tō-nē'ō fā-chē-nēt'ē): b. Bologna, Italy, 1519; d. 30 Dec. 1591. He occupied the papal chair only from the 29th of October preceding his death.

Innocent X. (**GIOVANNI BATTISTA PAMFILI**, jō-van'nē bät-tēs'tā pām-fē'lē): b. Rome 7 May 1574; d. 6 Jan. 1655. In 1629 he was elevated to the cardinalate and became Pope in 1644. Under him the temporal and spiritual power of the papacy was greatly increased. In 1651 he condemned the Treaty of Westphalia and he formally condemned Jansenism in 1653.

Innocent XI. (**BENEDETTO ODESCALCHI**, bā-nā-dēt'tō ä-dēs-kāl'kē): b. Como, Italy, 1611; d. 12 Aug. 1689. He served in his youth as a soldier in Germany and Poland, took orders later and rose through many important posts, until he was elected Pope in 1676, on the death of Clement X. He was eminent for his probity and austerity; zealously opposed nepotism and simony, and restrained luxury and excess. He condemned the New Testament of Mons and several other Jansenistic works. He also anathematized sixty-five propositions drawn from the works of modern Casuists and condemned

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Molinos and the Quietists. He determined to abolish the right of asylum exercised in Rome by foreign ambassadors; but Louis XIV. would not yield to so just a claim, occupied Avignon, and imprisoned the papal nuncio in France; in consequence of which the authority of the Pope received a severe blow by the IV. Propositions Cleri Gallicani in 1682. These disputes were highly favorable to the English Revolution, as it induced the Pope in 1689 to unite with the allies against James II., in order to lower the influence of Louis XIV.

Innocent XII. (ANTONIO PIGNATELLI, än-tō-né'ō pēn-yā-tē'lē): b. Naples 13 March 1655; d. 27 Sept. 1700. He became archbishop of Naples, a cardinal in 1681, and Pope in 1692. During his pontificate Louis XIV. and the French bishops revoked the Declaration of the French clergy, and submitted to the judgment of the Holy See in the matters in dispute during the pontificate of Innocent XI.

Innocent XIII. (MICHELANGELO CONTI, mē-kēl-än'jē-lō kōn'tē): b. Rome 15 May 1655; d. 7 March 1724. In 1695 he was made archbishop of Tarsus, and became a cardinal in 1707. He was also made bishop of Viterbo in 1712 and succeeded Clement XI. in the papal chair in 1721.

Innocents, Feast of Holy, variously styled Innocent's Day and Childermas, a festival generally observed on the 28th, but in the Eastern Church on 29 December, in commemoration of the massacre of the children at Bethlehem, "from two years old and under," by the order of Herod, with the purpose of destroying among them the infant Saviour. The Church of England at the Reformation retained it in its ritual among its anniversary festivals. St. Cyprian refers to these children as martyrs, as does St. Augustine with still greater explicitness. It is to them that the hymn of Prudentius, 'Salvete Flores Martyrum,' is addressed.

Innocents Abroad, The, a famous book of travels by Samuel L. Clemens ("Mark Twain"). In a vein of highly original humor this widely-read book records a pleasure excursion to Europe, the Holy Land, and Egypt, in the sixties. Descriptions of real events and the peoples and lands visited are enlivened by more or less fictitious dialogue and adventures.

In'novators, a name applied in Great Britain to educational reformers who, in the 19th century, succeeded in having corporal punishment abolished in public and private schools. The novels of Charles Dickens, particularly 'Nicholas Nickleby,' and 'Oliver Twist,' had much to do with the origin of the reform movement.

Inns of Court are certain societies in Great Britain exclusively invested with the right to call to the bar. The colleges of the English professors and students of common law are called inns, the old English word for the houses of noblemen, bishops, and others of extraordinary note, being of the same significance as the French *hôtel*. The opinion is, that societies of lawyers, which before the Conquest held their chief abodes for study in ecclesiastical houses, began to be collected into permanent residences, soon after the court of common pleas was directed to be held in a fixed place,—a stipulation which occurs in the great charters

both of King John and Henry III. In these houses exercises were performed, lectures read, and degrees conferred. The inns of court are governed by masters, benchers, stewards, and other officers, and have public halls for dining, readings, etc. In London the four inns of court are: the Inner Temple and Middle Temple (formerly the dwelling of the Knights Templars, and purchased by some professors of law more than three centuries since); Lincoln's Inn and Gray's Inn (anciently belonging to the Earls of Lincoln and Gray). Each inn is self-governing, and all have equal privileges.

Innsbruck, īns'brook, or **Innspruck** (ancient *CENIPONTUM*; locally called *SCHFRUCK*), Austrian town and capital of the Tyrol, beautifully situated 59 miles north of Munich, on the banks of the Inn, near the confluence of the Sill, and almost in the centre of the valley of the Inn (Innthal), the sides of which are enclosed by mountains several miles distant, but so lofty (7,000 to 8,500 feet) as apparently almost to overhang the town. It consists of the town proper, situated on the right bank of the river, and of five suburbs. It is for the most part well built. The houses are generally of a limestone breccia, and from four to five stories high, and built in the Italian style. The buildings most deserving of notice are the Hofkirche, containing the tomb of the Emperor Maximilian I., one of the most splendid monuments of the kind in Europe, though he himself is not interred in it; and the tomb of Hofer; the Church of St. James, with a painting by Lucas Cranach; the Jesuits' church, considered the handsomest in the town; the Capuchin church, with good paintings; the new palace, built by Maria Theresa, a very extensive edifice, with gardens which stretch along the side of the Inn, and form an excellent promenade; the old palace, in which the Archdukes of Tyrol and several of the German emperors used to reside; the university, founded in 1677, and re-established in 1826, well endowed, provided with a library, botanical garden, and cabinet of natural history, and attended by about 1,000 students; a gymnasium, and several other important educational establishments; and the museum, called Ferdinandeum, rich in all the productions both of art and nature within the limits of the Tyrol. The manufactures include woolen, silk, and cotton tissues, gloves, glass, etc. As the capital of the Tyrol, Innsbruck is the place of assemblage for its states, and the seat of superior appeal, civil, and criminal courts, and of many important public offices. Many of the spots in the immediate vicinity have become memorable for the noble exploits which the Tyrolese peasantry performed in the war of Independence. Pop. (1890) 23,325.

Innuits, in'u-its. See ESKIMOS.

I'no, daughter of Cadmus and Harmonia, second wife of Athamas, king of Thebes, drew upon herself the anger of Hera by nursing Dionysus, the son by Zeus of her sister Semele. In order to favor her own children she projected the murder of her stepchildren, Phryxus and Helle, who saved themselves by flight. Hera, still more highly incensed, made Athamas, the husband of Ino, mad, and he dashed his eldest son by Ino, against a rock. Ino fled with

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her youngest son, Melicertes, and threw herself with him into the sea. Ino and Melicertes were made sea deities at the prayer of Dionysus. Ino was worshipped under the name of Leucothea.

Inocarpus, i-nō-kär'pūs, a genus of leguminous plants, having unifoliate leaves and yellow flowers in axillary spikes. *I. edulis* is the South Sea chestnut, native of Tahiti. It is a large tree, with luxuriant foliage, the delicate evergreen leaves being six inches or more in length. It furnishes seeds or nuts much valued in the South Sea Islands, the inhabitants gathering them while green, and mashing them for food.

Inocula'tion See INFECTION; VACCINATION.

In'osit ($C_6H_{12}O_6$), (from Greek *is*, *inos*, a nerve, a muscle), a saccharine substance found in the muscular tissues of the heart, as well as liver, brain, kidneys, etc. It appears both in health and, to an abnormal amount, in disease. It exists also in a number of plants, such as fox-glove, potato, kidney-bean, acacia, asparagus, cabbage. See GLUCOSE

Inouye Kaoru, ka-o'ru e-nō-o'yā, Count, Japanese statesman: b. in Choshū 1839, pupil of Yoshida Shoin. With Ito (q.v.), in 1862, he went secretly to Europe, and returning in 1864 became an unwavering exponent in Japan of the ideas lying at the root of Western civilization. Surviving the wounds made by reactionary assassins, he has, since 1868, served his country in various high positions, as the mikado's minister at home and as envoy abroad, especially in Korea. As minister of the interior he began the rebuilding of Tokyo from wood to brick. His famous memorial of 1873 called for moral improvement. For seven years, as head of the foreign office, he was active in treaty revision. He was created a peer in 1885, and again called to the office as minister of the interior in 1892, and retains the emperor's confidence as one of the surviving "elder statesmen," whose word in Japan is law. See KATSURA.

Inquiline, in'kwī-lin, a term applied in zoology to animals which live as tenants within the nests or homes of other animals. The use of the term is almost entirely confined to entomology and then often restricted to the cases in which the rightful and the intruding tenants are closely related. Similar cases among other animals are commonly designated as commensalism (q.v.), but these and similar terms are used rather loosely. Examples of the inquiline relation occur among the termites, ants, and bees, but are known especially among the gall-flies (*Cynipidae*); indeed, one entire division, comprising more than 500 species, is named *Inquiline*, because of the predominance of this mode of life. These insects differ but little in structure from the true gall-flies, but they lack the power to produce galls and consequently deposit their eggs within those of other species. They infest certain species of galls, as those of the blackberry and some oak-galls, in large numbers and sometimes more than one kind occur in a single gall. Perhaps the most remarkable feature of these inquilines is their frequent close resemblance to the insect which produces the gall which they infest.

Inquisi'tion, a tribunal or system of tribunals instituted by the Roman Catholic Church

for the discovery, examination, and conviction of heretics and their punishment by the secular arm. Under the successors of Constantine in the Roman Empire the repression of heresy, or rather the enforcement of the decrees of church councils and synods, was a function of the imperial government, which inflicted temporal penalties upon the propagators of religious beliefs that contradicted the creeds approved by the State. When the reigning emperor was a favorer of Arianism or any other of the heterodox creeds, the orthodox bishops and their flocks were persecuted: when he was of the orthodox party the heterodox sects were put under the ban. In executing the decrees of the councils the imperial officials, called in the laws of Theodosius and Justinian "inquisitors" (*inquisitores*), were assisted by the bishops; but the tribunals were the ordinary secular courts, and judgment was rendered in the name of the State, not the Church. But in the 12th century, when the supremacy of the ecclesiastical power was universally recognized in western Europe, the initiative in the work of repressing heresy was taken by the Church as of course, and the discovery, trial and conviction of the offenders were functions of the ecclesiastical power solely: the secular power simply executed the judgments of the church tribunals. Boniface VIII.'s definition of the respective powers and the mutual relations of church and state was not proclaimed till the close of the 13th century; but had a similar definition been promulgated in the 12th century it would have expressed the universal sentiment of princes and peoples at the time. The celebrated bull, *Unam Sanctam*, defines that "Both swords, the spiritual and the temporal, are in the power of the Church; yet the one is to be wielded for the Church's behoof, but the other by the Church herself: the one by the hand of the priest, the other by that of the king and the soldier, though at the will and sufferance of the priest *ad iutum et patientiam sacerdotis*. And sword must be subordinate to sword—*oporet gladium esse sub gladio*, and the temporal authority subject to the spiritual power—*temporalem auctoritatem spirituali subjici potestati*."

The first step toward the establishment of courts of inquisition would seem to have been taken in 1179 when the third council of the Lateran issued a decree of excommunication against the adherents of the heretical sects of southern France, who are charged not only with holding abominable heretical tenets but also with practising "unheard-of cruelties against the Catholics," demolishing the churches and massacring widows and orphans. The council grants "an indulgence of two years to those who shall make war on them." This decree was re-enforced by the Council of Verona (1184) over which Pope Lucius III. presided, and at which the Emperor Frederic I. assisted: the Council directs the bishops to bring to trial persons accused of heresy and to inflict fit punishment on the guilty. The fourth Council of the Lateran (1215), held in the reign of Innocent III., imposed on the bishops the duty of making a visitation of their dioceses twice or at least once a year either personally or by delegates to see that the Church's laws be enforced. Bishops are authorized to bind the

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inhabitants of a district by oath to search out heretics and bring them to trial. By the Council of Toulouse (1229) in the pontificate of Gregory IX, the search for heretics (*inquisitio hereticae pravitatis*) was systematized. The bishops are to name for each parish two or three respectable laymen who shall take oath zealously to search out heretics and to deliver them up to the *baillis*. Whosoever knowingly conceals a heretic loses all his goods. If heretics are discovered on the estate of a land-owner, he incurs the penalties: the house of the heretic shall be torn down. Heretics who recant have to seek a new abode, and must wear on their clothing two crosses of different colors until the Pope or his legate permits them to assume the ordinary garb. Whoever abstains from use of the sacraments is held suspect of heresy. A person convicted or suspect of heresy is debarred from the practice of medicine. Lest the ordinary church authorities should be remiss in carrying out this system Gregory IX. named (1232) as "pontifical inquisitors" monks or friars from outside, chiefly Dominicans; shortly after the pontifical inquisitors were chosen from the order of the Dominicans exclusively. Thus the duty of inquisition was taken out of the hands of the bishops and was discharged by officials responsible only to the Pope; from the judgments of the inquisitorial tribunals there was no appeal but only to the Holy See: in 1263 Urban IV. appointed an inquisitor-general for Provence, as a means of lowering the flood of appeals to Rome. The institution passed from southern France into the other provinces of that kingdom and into Italy, Germany and Poland. The Inquisition in England was directed by the metropolitans and their suffragans without being responsible to any inquisitor-general: but as long as Lollardism disturbed the peace of the Church the search for heretics was prosecuted rigorously: bishops and archdeacons were required twice a year to make inquisition of suspects: any man might be compelled under penalties to inform against persons suspected of heresy; the statute *de haeretico comburendo* was enacted by the Parliament in 1396.

In Spain the Inquisition, as set up in 1481 by Ferdinand and Isabella, was as much (or more) a political as an ecclesiastical institution: the officials from highest to lowest were appointed by the sovereigns and its action was directed by them without responsibility to the Holy See: Ranke calls the Spanish Inquisition "a royal tribunal furnished with spiritual weapons"; Llorente admits as much. The number of persons put to death under sentence of the Inquisition in Spain is put by Llorente at 31,000 from first to last, that is during 330 years. But Llorente made it impossible to check his statements by burning the original documents. Ranke impeaches his honesty; Prescott says that his estimates are "most improbable." Catholic historians call attention to the fact that not only heresy, but many other offenses against the laws were judged by the courts of inquisition in Spain, *viz.*: polygamy, seduction, unnatural crimes, smuggling, witchcraft, sorcery, false personation, etc. At the time when the Inquisition flourished, persecution for heresy was a universal practice amongst all Christian peoples, and the methods of punishment inflicted were

general throughout Europe. Protestant England persecuted as harshly and vigorously as Catholic Spain, and in both countries denial of the state religion was equivalent to treason.

Insane Asylums, Cottage System, or Village Plan. A form of construction for insane asylums and charitable institutions, much in vogue at the present time, in which large and imposing buildings are replaced by detached cottages. The cottages vary in size from those which will accommodate six to a dozen patients to larger ones which will accommodate 20 or more. They are usually constructed either in groups or along streets and avenues as a village. In the former, the several groups are given up to a particular industry as a farm group, where the patients are employed at farming, and others, as the garden, the brick yard, shop industries, etc., all of these being a part of one institution on a single large estate. In the village plan the institution is laid off in streets and avenues, and has the appearance of an ordinary village, each cottage having a flower garden in front, shade trees, etc. In either plan, there is conveniently located near the centre of the plant an administration building, a hospital for the sick and those requiring special care, a bakery, a laundry, and other utility buildings. The cottages may be constructed of wood or other material, and the cost of construction is small as compared with the old plan of asylum construction. It is, besides, more homelike, more convenient for administration and permits of indefinite expansion. Some of the best known institutions constructed on this plan are Alt-Scherbitz near Leipzig; Gambersee near Munich, Germany; the Saint Lawrence State Hospital at Ogdensburg, N. Y., and the Craig Colony for Epileptics at Soneyea, N. Y.

Insanity, a disease of the brain characterized by disorder or derangement of the mental faculties. This is its strictly pathological or scientific definition. Therefore, according to this definition, any disease of, or accident to, the brain whatsoever, provided such disease or accident caused any derangement of the mental faculties, howsoever trifling or temporary, would furnish an example of insanity. Thus a blow on the head causing unconsciousness, or a fever giving rise to delirium, is an example of an affection of the brain characterized by disorder of the mental faculties. Practically, however, the term insanity is limited to a group of afflictions of the brain which is more distinctly fixed, and the members of which it will be the object of this brief sketch to define.

Causes.—The causes of insanity are many and various, and the chief of these are the following: Heredity, infection, poisoning, traumatism or injury, overwork or exhaustion, and mental and moral shock or strain. Of importance also are age, sex, race, and nationality.

Of all these causes the most important undoubtedly is heredity. As Krafft-Ebing, the German alienist, has well said, there is no ground, except in tuberculosis, upon which heredity shows itself more distinctly than in the case of mental disease. Statistics have been compiled by various authors to show as nearly as possible the exact prevalence of heredity in insanity, but the results have not been altogether in harmony. In fact, it is extremely difficult to determine this factor in many cases

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in which it has been active, and this is so for two reasons: in the first place many patients and their friends conceal or deny a hereditary taint, and in the second place not a few patients and their friends, are really ignorant of their family histories beyond a generation or two. How many persons can tell accurately of what their grandparents died? The more this subject of heredity in insanity is investigated the more reason there is to believe that its importance has been underestimated rather than the reverse. And yet as a factor in causation it is much more common in some forms of insanity than in others—a fact which will be emphasized later in this article. Some authorities have limited heredity to the direct line of descent, ignoring collateral lines; but obviously this restriction cannot be maintained. And yet, if the attempt is made to trace a neurotic taint through collateral lines, the difficulty is greatly increased. The subject is vastly broadened, and, from the medico-legal standpoint, the inquiry becomes greatly involved. In mental heredity, moreover, it is not so much the particular disease that is passed on from parent to offspring, as it is the predisposition; and this predisposition, often called neurotic, is not the result entirely of insanity in the ancestry, but may be shown by a family history of other grave nervous disorders, such as epilepsy, hysteria, neurasthenia, and imbecility. This is a fact not sufficiently apprehended by the laity.

Infections of various kinds may act as causes of insanity. The most important of these is syphilis, and this acts especially to cause that form of insanity known as general paresis. The various infectious diseases, such as typhoid fever, septicæmia, smallpox, cerebro-spinal meningitis and, in minor degree, some others, may cause mental alienation. Post-febrile insanity may follow typhoid fever; and puerperal insanity may be due in part to a septic infection.

Poisons of various kinds may be very active causes of insanity. Chronic lead poisoning may give rise to a well-known form of delirium or mania; so in minor degree may mercury. But the most potent and most common of all poisons in the etiology of mental disease is undoubtedly alcohol. And this poison acts in two ways, for it may not only induce insanity in the individual, but it also is most active in causing that hereditary predisposition to insanity in the offspring to which reference has already been made. In fact, the subject of heredity is not a little involved with the subject of alcoholism in the progenitor.

Traumatism, or injury, may act as an exciting cause of insanity. This is true especially of injuries to the head. Trauma acts most readily in conjunction with other causes, such as alcoholism and syphilis. Injuries to other parts of the body, especially when associated with great shock, as in severe railroad accidents, may lead to various forms of mental alienation.

Overwork and exhaustion from any causes whatever may predispose to, or directly cause, a mental breakdown. This is true especially in cases in which the blood is depleted, the nutrition of the nervous system impaired, and the mind harassed with care and anxiety. These causes are most active in persons otherwise predisposed, as by alcoholism, syphilis or heredity.

Mental and moral shock and strain, such as

sudden loss, grief, fright, mortification, intense religious and political excitement (as in the French Revolution), long continued anxiety, and the harassment of uncongenial surroundings, as in the home-life, may all act as causes of insanity.

The above are the chief categories of causes, but they do not exhaust the subject. It is in fact too extended for brief treatment. Finally, it must be borne in mind that in any individual case not one but a combination of several of the above causes has usually been active.

Classification.—Almost every alienist of repute has attempted a classification of the forms of insanity. The subject is one of peculiar difficulty, owing largely to the fact that our intimate knowledge of many of these various forms is far from complete. One of the most satisfactory schemes is the one by Krafft-Ebing, and is as follows, slightly abridged:

"A."

MENTAL DISEASES OF THE DEVELOPED BRAIN.

I. Diseases without Anatomical Lesions, or Functional Diseases.

(1) Psychoneuroses, or diseases of a brain otherwise sound.

1st. Melancholia.

a. Simple Melancholia.

b. Stuporous Melancholia.

c. Mania.

a. Maniacal Exaltation.

b. Frenzy.

c. Stupor, or Acute Dementia.

d. Hallucinatory Delirium.

Note.—The above affections are primarily curable, but the worst of them may terminate in chronic incurable forms and in dementia.

(2) Degenerative Insanities: Affections of a brain endowed with a morbid predisposition.

1st. Constitutional Affective Insanity.

a. Paranoia.

b. Congenital.

b. Acquired. This form includes various sub-groups according to the character of the delusions entertained by the patient.

c. Periodical Insanity.

d. Mental Affections arising from the constitutional neuroses.

a. Neurasthenical.

b. Epileptic.

c. Hysterical.

d. Hypochondriacal.

II. Organic Insanities or Mental Diseases with Recognizable Lesions in the Brain.

1st. Acute Delirium.

ad. General Paresis.

3d. Cerebral Syphilis.

4th. Senile Dementia.

Note.—Chronic Alcoholic Insanity and Morphinism may yet have to be added to this group.

"B."

MENTAL AFFECTIONS OF THE UNDEVELOPED BRAIN.

Idiocy and Imbecility.

This scheme by Krafft-Ebing, while not without defects, is excellent for practical purposes and until someone can devise a better. Its great merit is that it is flexible: it readily admits new forms. Its defect is that it draws too sharp a distinction between the so-called functional and the organic insanities; and between the psychoneuroses and the constitutional forms. The truth is, all insanities are organic; and a constitutional taint may be present in the psychoneuroses.

Following this classification we note the following forms of insanity:

A. The whole group of insanities as distinct from idiocy is included under this head, and as a first great subdivision comes:

I. Mental Diseases without recognizable anatomical lesions: Functional Diseases. As

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was inferred above, this whole group is only tentative in one sense, because as scientific knowledge advances it is found more and more that insanity in all its forms depends upon anatomical changes. For the present, however, this group may be allowed, with some reservation, to contain the following:

(1) THE PSYCHONEUROSES. In these forms the mental disease is such as can happen in a person with an otherwise perfectly normal brain. It is in a sense fortuitous, and not dependent necessarily upon a hereditary taint. Given the same causes, and it may be presumed that any person might develop a psychoneurosis, just as he might develop a fever. By this it is not implied, however, that heredity cannot act to predispose to these forms.

Melancholia is marked by depression. The affective or emotional, rather than the intellectual, faculties are involved. The patient has a sense of personal unworthiness; in other words, the depression centres about the patient's ego. He is not so much concerned about his misfortunes or his troubles, as about his unworthiness. Neither is he concerned about other persons: he is entirely self-centred. This may be said to be the keynote of melancholia. Delusions of a depressive character, as of having committed the unpardonable sin, may be present. The depression may become so profound and overwhelming that the patient passes into a stuporous or atonic state. (*Melancholia Attonita*.) In this state the physical functions, such as appetite, digestion, and nutrition, may be correspondingly depressed. Suicide may result. In some cases the patient is restless under the burden of his mental suffering (*Melancholia Agitata*).

Mania is marked by exaltation. The intellectual faculties are much more involved than in melancholia, and the patient is active, loquacious, sometimes destructive and combative, or else gay. He is somewhat incoherent, and his delusions are not well-defined, but fleeting and changeable in accord with his varying moods and disordered thoughts. The physical functions suffer as a result of exhaustion from overactivity. *Frenzy* is only a higher degree of mania, in which the mental functions are in entire disorder from over-excitation. Exhaustion is rapid.

Stupor, as its name indicates, is a psychosis in which the predominant tone is one of profound subversion of all the mental functions. *Acute Dementia* is another term for it. The patient may recover from a most unpromising state, especially in the case of young persons. *Dementia Praecox* is such a form, although the prognosis is not always good. *Primary Dementia* occurs without preceding acute stages.

Hallucinatory Delirium is a form of acute insanity marked by confusion and by the presence of hallucinations of sight and hearing. *Confusional* insanity is a term sometimes used, especially for the types which occur after acute infection, such as post-febrile insanity, and some forms following child-birth.

All these psychoneuroses may, in unfavorable cases, pass into chronic forms, and terminate in incurable dementia.

(2) THE DEGENERATIVE INSANITIES.

In these forms mental deterioration is engrafted on a constitutional defect. Heredity plays a great part. The patients have been born

with the neurotic predisposition. Their insanity is simply a logical evolution of a badly organized nervous system.

The great type of this form of insanity is *Paranoia*. The chief characteristic is the formation of systematized delusions. At first these may be of a persecutory tinge: the patient believes that he has enemies, who plot against his welfare or his life. He has hallucinations, especially of hearing. In a second stage, the delusions acquire a more expansive type: the patient believes that he is some great personage. As preliminary to all this, there is often a long career of moral and mental perversion: the patient has been noted as erratic, eccentric, visionary, and even immoral. He usually has displayed but little real brain power or steadiness, but often an intense egotism and a lack of common sense. Innumerable varieties and several stages occur. From this class are recruited in large part the criminal insane. These patients are the monomaniacs of the older writers, and they include also the moral lunatics, pyromaniacs and kleptomaniacs of more recent systematists. Among them are found also the victims of obsessions, morbid impulses and fixed ideas. The paranoiacs are the dangerous lunatics, and the prognosis is not favorable.

Periodical Insanity is a form of constitutional insanity in which, as the name indicates, there is a tendency to recurrence. This recurrence is sometimes in cycles (*Circular Insanity*), in which there is a period of maniacal exaltation, followed by one of melancholic depression, and then a somewhat prolonged period of apparent recovery, to be followed again by the morbid cycle. With every recurring cycle, however, the patient deteriorates somewhat, and may eventually degenerate into chronic insanity.

In the constitutional nervous diseases, such as Epilepsy, Hysteria, Hypochondria, and Neurasthenia, there are often mental changes of a morbid type, and these give rise to the forms of insanity named in accord with these respective neuroses. The symptoms vary widely in the several diseases.

II. In the organic insanities, so-called, the disease is marked by recognizable changes in the brain-structure.

Acute Delirium, or Bell's mania, is an acute infectious disease of the brain, of unknown origin, and of rapid progress, usually terminating fatally. It is marked by confusion and delirium, passing into coma and death. The changes in the brain are of an inflammatory kind.

General Paresis, or *Dementia Paralytica*, is caused by a progressive infectious or destructive process in the brain substance. Its dependence on syphilis is no doubt close, and it is further induced by alcoholism, dissipation and over-work. It is marked by change of character, erratic conduct and loss of mental and moral control, passing on into a stage of expansive delusions with progressive dementia. There are also characteristic speech defects, changes in the ocular muscles and in the gait, with increasing feebleness and paralysis. Various crises occur, such as maniacal, epileptoid and apoplectic, and in the last stage the patient is paralyzed and demented. Death is the inevitable result in the vast majority of cases.

In *Cerebral Syphilis* there is a characteristic inflammatory process beginning in the coats of the small blood-vessels. Mental symptoms oc-

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cur in great variety, also many forms of paralysis.

Senile Dementia is a form of deterioration occurring in old age, and is dependent primarily on changes in the blood-vessels in the brain. Progressive failure of mental powers, with occasional delusions, is the chief feature. In some cases paralytic and epileptic crises occur.

B. Finally we have the great group in which the mental affections are the results of arrest of development of the brain. These are not included in insanity proper by systematic writers, but are regarded as a group apart. This group includes Imbecility and Idiocy, and is defined under the latter head.

No attempt has been made in the above classification to include various debatable forms. Among such forms are *Hebephrenia* (occurring in adolescence) and *Katatonio* (a psychoneurosis with both melancholic and confusional symptoms), and some others about which alienists are not yet agreed. The list must still remain open.

PATHOLOGY.—In the group of organic insanities it has been pointed out that these diseases rest upon a recognizable anatomical basis: thus in general paresis the structural changes in the blood-vessels and tissues of the brain are so marked and so well studied that this disease may be said to have as well known a morbid anatomy as pneumonia. But this is true of very few of the insanities, and the above classification is constructed largely on the distinction between forms of insanity with, and those without, well-defined anatomical changes. But while such changes cannot in many cases be detected even with the most powerful microscope, there is practically no doubt in the minds of most alienists that all insanities depend upon a physical or structural basis. In other words, they are but manifestations of morbid changes in the brain-cells. To detect these changes is still one of the great problems of psychiatry. The tendency of modern pathology is to seek for the anatomical changes of insanity mainly in two directions: first, in heredity; and, second, in infection or toxæmia. Heredity makes its impressions so invisibly upon the brain-cell that there may be wise doubts whether we shall ever be able to detect them; but its signs, or stigmata, on the body at large are not so difficult to distinguish. The main difficulty is to interpret them. By these stigmata are meant defects or peculiarities in the grosser parts of the body, as in the bones, especially of the head and face, the ears, eyes, teeth, etc. As to infection, and the marks of it as found in the brain-cells, the evidence accumulates more and more that in many forms of insanity, especially those called functional, the direct agent is often a poison circulating in the blood and interfering with the nutrition and functioning of the brain plasma. Syphilis and chronic alcoholic poisoning leave definite changes in the blood-vessels, tissues, and membranes of the brain.

Treatment.—The treatment of insanity resolves itself into the preventive and the curative. Modern practice is beginning to concern itself more and more with the former, while of course it does not in any way relax its attention to the latter. The prodromal, or initiative, symptoms of many forms of insanity, especially the psychoneuroses, are now so well understood, that

it is often an easy matter to recognize the insidious changes that herald a mental breakdown, and to guard the patient from the dangers and misfortunes of a fully developed attack. Of first importance is to remove the patient from the exciting causes. Complete rest and isolation are therefore required and cannot be instituted too early. In order to secure these, hospital treatment is often essential. Very recently it has been proposed to treat these patients in general hospitals, in special wards, and not to hurry them into asylums under legal certification. In other words, they are to be regarded simply as other sick persons, and not to be immured merely as lunatics. The motive is thoroughly humane, and the practice is often successful in promising and selected cases. The indications are for rest, isolation and attention to the nutrition especially. There is no specific for insanity except in cases in which syphilis is active.

In very many cases, however, the nature and course of the disease render it imperative to commit the patient to special hospitals for the insane. This is not only for the good of the patient, but also for the welfare of society. These hospitals or asylums in all civilized countries are now among the very best of public institutions, and the prejudices once existing against them are no longer warranted. The indications for treatment vary according to the nature of the case. The weak and exhausted must be built up; the depressed must be encouraged and diverted; the violent and excited must be restrained; the chronic and demented must be cared for often as though they were children. The practice of to-day is in favor of all humane methods, such as by recreation, useful employment, amusements, and an appeal to the best remaining or active elements of the mental life. Physical restraint is reduced to a minimum, although in the most violent cases it cannot be entirely abolished. Punishment is practically abandoned. It is satisfactory to know that all our best regulated hospitals for the insane are enabled to report annually a good percentage of recoveries, and this is in accord with the teaching and practice of modern science, which regards insanity entirely from its physical aspect as a disease of the brain. With this definition this brief article may end as it began.

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Inscriptions, records, engraved on stone, metal or clay. Inscriptions are in many cases the sole sources of our knowledge of ancient history and languages; and, even when MSS. are extant, inscriptions, which preserve the original

INSECT POWDER — INSECTICIDE

forms of the letters, are of supreme paleographical importance. All the books of the Phoenicians, Etruscans, Oscans, Umbrians, Babylonians, Assyrians, Numidians, and Iberians have perished, and our knowledge of early Oriental history is derived solely from inscriptions. More than 150,000 inscriptions are known. The chief classes are Semitic, Greek, Latin, Runic, Cuneiform, Egyptian, and Indian.

In Greenland, on the shores of Baffin Bay and Davis Strait, true Runic inscriptions have been discovered. They were doubtless executed by Icelandic colonists or explorers. Records once supposed to be Runic, Punic, Celtiberic, or Numidian, have also been found in the United States, as on the Dighton Rock in Massachusetts, in the island of Monhegan off the coast of Maine, in the Grave Creek Mound in West Virginia. They are, however, either natural markings on the rock, or the records of Indian tribes, or even inscriptions of early colonists. The numerous inscriptions on the walls of the palaces and temples in the ruined cities of Yucatan, Honduras, Mexico, and Guatemala are written in characters, which constitute a system of hieroglyphic or pictorial writing, akin probably to that of the Aztec MSS. which have as yet proved undecipherable.

Insect Powder, the powdered heads of certain species of chrysanthemums of the genus *Pyrethrum* whose flowers contain a volatile oil which kills insects by asphyxiation. An Asiatic species (*P. roseum*) is used in the Old World for making the insectfuge powders called pyrethrum, Persian, Dalmatian or buhach. Substantially the same thing is manufactured in California where another species (*P. cinerariaefolium*) is grown in extensive crops, and the sun-dried heads, gathered in May and June, are ground between millstones, bolted and hermetically sealed in cans. These species are also grown as garden chrysanthemums, are eaten, after drying, by live-stock, and the powder has no evil effect upon the larger animals or man.

Insecticide, any agent which destroys insects. This definition includes natural as well as artificial means of control, the latter being those operated by man. The most important of the former are adverse temperatures, excessive or insufficient moisture, fire, bacteria, fungi, mites, spiders, fish, reptiles, insects, and birds. The artificial controls may be grouped according to their mode of action. Two principal groups are recognized; those intended to reach the alimentary tract through which they act, and those that act through the respiratory apparatus. The former are effective only with such insects as bite off and swallow pieces of plant tissue; the latter more or less also with these, but most frequently used upon insects which suck the plant juices from beneath the punctured epidermis. Caterpillars, beetles and their larvæ, grasshoppers, etc., all chew their food and have been most effectively controlled by Paris green, hellebore, arsenate of lead, etc., applied to the infested foliage either as a spray or as a powder. Plant-lice, plant-bugs, and other sucking insects have been held in check best by kerosene emulsion, whale-oil soap, fir-tree oil, or other substances that choke the breathing-pores in the insects' bodies. Some of these insects are dreaded because of their great prolificacy, their

small size and resistance to treatment. Gases are often used under favorable circumstances to reach insects troublesome in stored grain, among clothes, upon plants in greenhouses, and even upon plants in the open air—these last being covered with tents or boxes while being fumigated. Various chewing insects which tunnel through the tissues cannot be controlled by sprays, and are usually beyond the reach of gases. The leaf-miners, which burrow just beneath the epidermis of leaves and green stems, have never been effectively controlled. Some borers (currant-borer) can be kept in check by burning the twigs they infest, (peach-borer) by prodding them in their burrows, (squash-vine-borer), by cutting them out, the method being suggested by the nature of attack. Other chewing insects (plum curculio) are jarred into kerosene. Lastly there are various oils and greases which are used upon animals and man to destroy fleas, lice, etc. Tobacco water and carbolic acid are also similarly employed.

Formulae and Methods of Application.—Paris green should be mixed with a little water to form a creamy fluid, and then added to water or Bordeaux mixture (see FUNGICIDE) at the rate of one pound to 200 gallons or more. Arsenate of lead may be applied somewhat more liberally. Hellebore may be mixed with water (1 ounce to 3 gallons) and a little glue or flour paste to increase adhesiveness. Each of these may be applied as a powder sifted on the plant, through a salt sack or blown upon them through a powder-gun. A little flour aids the sticking quality. When powders are used, the plants should still be wet with dew or rain. Kerosene emulsion is made by intimately mixing a solution of hard soap (one pound to two gallons of hot water) with four gallons of kerosene, and diluting as needed for use with from 30 to 60 gallons of water. Pure kerosene and crude petroleum can be safely applied only to dormant plants, and then only upon bright breezy days, which will hasten evaporation. Kero-water pumps mix kerosene and water drawn from separate tanks, and apply the mixture direct to plants. They have hardly passed the experimental stage. Whale oil soap is mixed with water (1 pound to 1 or up to 10 gallons), and applied as a wash or spray. Carbon disulphide may be used where there is no danger of its inflammable fumes coming in contact with flame. An ounce is sufficient for from 50 to 75 cubic feet of air-tight space; and the exposure should be for 24 hours or longer. Hydrocyanic acid gas is prepared by adding cyanide of potassium (98-99 per cent pure) to water and sulphuric acid (cyanide, 1 ounce; water $2\frac{1}{4}$ ounces; acid, $1\frac{1}{2}$ ounces for every 250 cubic feet of greenhouse; 100 cubic feet of nursery stock-room and 125 feet of dwelling house rooms, flour-mills, trees, etc.). Exposures may be from 30 to 60 minutes for trees, the former time being for plants in active growth, the latter for dormant ones; from 12 to 24 hours is usual for rooms, granaries, etc. Since these gases are considered violent poisons the greatest care should be exercised in their application. Oils and greases are merely rubbed on infested animals and man. Boiling water is effective in destroying both lice and eggs in clothing, but the clothing must be boiled for hours to destroy the eggs of the body-louse and the crab-louse. Dust, tobacco-dust, etc., are useful in poultry

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yards for the birds to wallow in. Carbolic soap is the favorite remedy for insects on pet animals. But with all stock, poultry, pets and man, cleanliness is the great preventive.

For condensed information concerning insecticides, consult: Circular No. 1, Division of Entomology, U. S. Department of Agriculture, 1891; Marlatt, 'Important Insecticides,' Farmers' Bulletin No. 127, U. S. Department of Agriculture; Hinds, 'Carbon Disulphid as an Insecticide,' Farmers' Bulletin 145 (as above); Johnson, 'Fumigation Methods' (New York, 1902).

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Insectivora, an order of mammals, all of small size, usually five-toed, more or less plantigrade, and as a rule, possessing clavicles. "The snout is generally long, and is often prolonged into a small proboscis. There is a tendency for the teeth to be of a generalized type and their number is often the typical mammalian 44. Moreover, trituberculate teeth, which are certainly of an ancient form, are common." These teeth are adapted to feed on worms and insects alone. Many other evidences go to show that the type is a very old one, and Beddard thinks it may have survived because of the small size, imitative adaptiveness and nocturnal habits. Woodward speaks of the group as probably the little-altered survivors of some of the most primitive placental mammals, agreeing with the *Credonta* in their low type of brain. Most of the families may be traced back to the upper Eocene. The order falls into two divisions, (1) True Insectivores, including the hedgehogs (*Erinaceidae*), squirrel-shrews (*Tupaiidae*), tanrecs (*Centetidae*) otter-shrews (*Potamalidae*), huntas (*Solenodontidae*), golden moles (*Chrysochloridae*), elephant-shrews (*Macroscelidae*), aquatic moles (*Talpidae*), shrews (*Soricidae*); and (2) Dermaptera, embracing only the colugos (*Galeopithecidæ*). See HEDGEHOG; MOLE.

Insectivorous Plants. See CARNIVOROUS PLANTS.

Insects (Lat. *insectum*), a class of *Arthropoda* characterized by the body being divided into three regions, that is, a head, thorax, and hind-body or abdomen, and by the presence, in all but the more primitive and certain degraded forms, of wings, and of three pairs of thoracic legs. The body of insects consists of 21 segments (somites) of which six are used together to form the head, while there are three thoracic, and from 10 to 12 abdominal segments. To the head are appended five pairs of jointed appendages, that is, the antennæ, mandibles, and two pairs of maxillæ, while in the embryo of certain insects and in the adult *Campodea*, there has been detected a pair of vestigial appendages. Besides these appendages, there are two compound eyes, one on each side, and usually three simple eyes (ocelli) situated in the middle of the head. While the antennæ are undivided the first maxillæ are subdivided into three branches, an inner (lacinia), a middle (galea), and outer (palpifer), bearing the palpus. The second maxillæ are fused together, forming the under lip or labium; each second maxilla is composed of a lacinia, the palpus, while vestiges of the galea occur in certain forms. In bees certain accessory appendages called paraglossae are present. Besides the maxillæ, the so-called tongue or hypo-

pharynx is present, being highly developed in bees; it lies on the under side of the mouth, just above the labium; in caterpillars it receives the end of the salivary duct, and is called the spinneret. Attention should also be called to the upper lip or labium, on the under side of which is the epipharynx, which bears minute taste-pits. The thorax consists of three segments, which can be easily distinguished in the primitive wingless forms (*Campodea*) and in the cockroach and locust, but in the more specialized forms as beetles, moths, bees and flies, the segments are more or less fused together and, owing to the movements of the wing muscles, are subdivided into many separate pieces. In the wasps and bees the basal abdominal segment becomes toward the pupa state transferred to the thorax. The legs as a rule end in five jointed tarsi, the last joint bearing a pair of claws with a cushion (pulvilli) between them. Insects are enabled to walk on glass, etc., by means of a sticky fluid exuded from the ends of hollow hairs fringing the cushion. They climb by means of their claws.

Insects differ from all other animals except birds and bats in possessing wings, and their presence, especially that of the muscles of flight, have greatly modified the shape and structure of the thorax. The front pair of wings is attached to the middle thoracic segment (mesothorax) and the hind wings to the metathorax. In the two-winged flies (*Diptera*), the second pair of wings are reduced and modified to form the balancers (halteres). The wings are flat sac-like outgrowths of the skin, and are strengthened by the "veins" which form hollow rods. These veins contain a trachea, so that there is a space between the air-tube and the outer wall. When the insect emerges from the nymph or the pupa, the vein is filled with blood. The spaces enclosed by the veins and their cross-branches are called cells, and their shape often affords valuable generic and specific characters. In the more primitive insects there are numerous cross-veins, and such wings as in locusts, etc., are said to be net-veined. In the *Lepidoptera* there are few cross-veins. In the *Diptera* and *Hymenoptera* the number of veins is limited, the cells also being few. The skin of insects is hard, dense and elastic, due to the deposition of chitin.

Internal Anatomy.—One of the distinctive characteristics of insects is their mode of respiration. This is effected by an intricate system of internal air-tubes (tracheæ), which are filled with air by openings (spiracles) in the sides of the body; of these spiracles there are from one to two pairs in the thorax, and eight pairs in the abdomen. The tracheæ are kept permanently open by a series of threads (taenidium) each of which makes from three to five turns around the thin tube; in this way the entire tracheal branch is provided with what at first was supposed to be a continuous spiral thread. The slit-like openings of the spiracles are guarded by a grate of stiff hairs to prevent the ingress of dust, etc. It should be borne in mind that no insect breathes through its mouth, but through the spiracles. Hence the efficacy of all oily or greasy substances in destroying every kind of insect in whatever stage of growth; wherever the oil touches the body a thin film spreads over it, covering the air-openings so that the insect soon dies by asphyxiation. Though

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Insects have a delicate pulsating tubular heart, they have no arteries and veins, since the air in the tracheæ seeks the blood in the remotest parts of the body. The blood is thin and colorless. The aquatic larvæ and a very few perfect insects breathe by external tracheal gills, the spiracles being in such cases often absent. The genital opening is always situated near the end of the body, in front of the vent on the under side. Besides a complicated digestive canal, insects have urinary tubes opening into the end of the intestine.

The nervous system consists, besides the brain, of a chain of ganglia the greatest number of which is 13, but which become more or less fused in the more specialized groups, especially in the flies. The brain is remarkably complex, in accordance with the varied and complicated movements of the segmented body and jointed appendages, all capable of different kinds of motions.

Sense of Sight.—The compound or faceted eyes (*ommatidia*) are composed of numerous simple eyes called ommatidia, which vary in number from 12, in *Lepisma*, to 20,000 in the dragon-fly (*Aeschna*), and even 25,000 in a beetle (*Mordella*). Yet notwithstanding the wonderful complexity of these compound eyes, most insects are near-sighted, and perceive rather the movements of other animals than their exact outlines; the dragonfly and butterfly can see for a considerable distance. The simple eye probably only enables the insect to distinguish daylight from darkness, or at most very near objects. Insects, like bees and butterflies, have the color-sense, and prefer certain colors to others.

Sense of Smell.—Insects are chiefly guided by the sense of smell. This resides in the antennæ, in which there are microscopic pits filled with fluid; to this pit goes a fine nerve whose fibres end in staff-like sense cells. The number of these olfactory organs is in some insects enormous; thus in the European cockchafer there are 39,000 in the leaves of the male antennæ, and about 35,000 in those of the female; in a single antenna of the hornet (*Vespa crabro*) are about 13,000 to 14,000. In the cockroach the abdominal cerci or feelers also possess such pits.

Sense of Hearing.—The auditory organs of the locust are drum-like ears situated one on each side of the base of the abdomen, directly behind the first abdominal spiracle; in the green grasshopper, katydids, etc., a little auditory sac is lodged in the fore-legs (*tibiae*). It is supposed that most insects are destitute of the sense of hearing, at least auditory structures have not yet been detected; yet all sound-producing insects must have ears to hear.

Sense of Taste.—The taste organs are little pits or papillæ which resemble the olfactory organs, but which occur on the inside of the upper lips, on the epipharynx, or at the base of the proboscis and maxillæ in the bee.

The Egg and Growth of Insects.—The eggs and the fertilizing fluid of the male are produced in glands which open near the end of the body on the under side. The eggs are deposited by the female in the earth or in wood, leaves, etc., by means of the ovipositor, an apparatus composed of three pairs of hard appendages, and which in the wasps and bees form the sting. Most insects die on the approach of cold weather,

when they lay their eggs, the species being represented in the winter by the eggs alone. The eggs hatch in spring, the embryo passing through remarkable changes.

Metamorphoses.—Most insects after hatching pass through a remarkable series of changes called a metamorphosis. The small flies, moths or beetles, are not the young of large ones, but adult insects, while the most primitive insects have no marked metamorphosis, the mature locust only differing from the young in having wings; the more specialized forms, as beetles, moths, wasps, bees, and flies, pass through two stages of growth, that is, the larva and pupa, before becoming winged and sexually mature.

Larva.—The name was first given by the ancients to the caterpillar because they thought it masked the form of the perfect insect. Swammerdam supposed that the larva contained within itself "the germ of the future butterfly, enclosed in what will be the case of the pupa, which is itself included in three or more skins, one over the other, that will successively cover the larva." But the discovery by Weismann (q.v.) of the germs of the imago (imaginal disks or buds) in the larva completely changed our notions of the nature of metamorphosis (q.v.), and revolutionized our knowledge of the fundamental processes concerned in the change from larva to pupa or chrysalis, and from pupa to imago. Not only are the larvæ of each order of insects characteristic in form, so that the grub or larva of beetles is readily distinguished from the larvæ of other groups, or the maggots of flies from the footless larva of ants, wasps and bees, but within the limits of the larger orders there is a great diversity of larval forms, showing that they are the result of adaptation to their surroundings and mode of life.

The larvæ of nearly if not all the metabolous animals are probably secondary in their origin. Fritz Muller (q.v.) pointed out that this is the case with the larvæ of the higher insects. The larva of a beetle is popularly called a grub; that of a fly a maggot. The young of the more primitive insects, such as the cockroach, locust, all bugs, etc., which undergo an incomplete metamorphosis, is called a *nymph*. See LARVA.

Pupa.—The word pupa is Latin, meaning baby. Linnaeus gave it this name from its resemblance to a baby which has been swathed or bound up, as is still the custom in Southern Europe. The term pupa should be restricted to the resting, inactive stage of the holometabolous insects, that is, those with a complete metamorphosis. The typical pupa is that of a moth or a butterfly, popularly called a chrysalis. A lepidopterous pupa in which the appendages are more or less folded close to the body and soldered to the integument, was called by Linnaeus a *pupa obtecta*; and when the limbs are free, as in Neuroptera, Mecoptera, Trichoptera, and the lepidopterous genus *Micropteryx*, it is called a *pupa libera*. When the pupa is enclosed in the old larval skin, which forms a pupal covering (puparium), the pupa was said by Linnaeus to be *coarctate*. The pupa of certain Diptera, as that of the orthorophous families, is nearly as much obtected as that of the tineoid families of moths, especially as regards the appendages of the head, the legs being more as in pupæ liberae. The pupæ of Coleoptera and of Hymenoptera, though there is, apparently, no near relationship between these two orders, are much alike in shape, and,

PROTECTIVE MIMICRY AMONG INSECTS.



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as Chapman pertinently suggests, those of both orders are helpless from their quiescence, and hence have resorted for protection to some cocoon or shell. But it is quite otherwise with the pupæ of Lepidoptera and Diptera, which vary so much in adaptation to their surroundings, and hence afford important taxonomical and phylogenetic characters. This, as regards the Lepidoptera, was almost wholly overlooked until Chapman called attention to the subject, and showed that the pupæ had characters of their own, of the greatest service in working out the classification, and hence the phylogeny of the different lepidopterous groups. The pupæ of the Neuroptera, Coleoptera and Hymenoptera differ structurally from the imago, in the parts of the head and thorax being less differentiated. Thus in the head the limits or sutures between the epipharynx and clypeus, and the occiput and gula, are obscurely marked, while the tergal and pleural sclerites of the imago are not well differentiated until the changes occurring just before the final ecdysis. It is easy, however, to homologize the appendages of the pupæ with those of the imago of all the holometabolous orders except in the case of the obtected pupæ of the Lepidoptera (and probably of the obtected dipterous pupæ), where the cephalic appendages are soldered together.

Classification of Insects.—The number of known species of insects is from 200,000 to 300,000, but it is estimated that there are upward of a million species now living. In fact, the class of insects vastly outnumbers all other groups of animals. This is probably due to their being winged, and to their great fecundity. At present the class of insects is divided into two subclasses, that is, the (1) *Synaptera*, represented by the wingless orders Thysanura and Collembola; and (2) *Pterygota*, comprising 15 winged orders and which may be thus tabulated:

Series 1.—*Heterometabola*, with an incomplete or variable, though slight, degree of metamorphosis. No distinct larva or pupa state, the young being nymphs.

- Order 1. Dermaptera. (Earwig)
" 2. Orthoptera. (Cockroach, locust, grasshopper, stick insect.)
" 3. Platyptera. (Bird lice, *Perla*, white ant.)
" 4. Odonata. (Dragonfly)
" 5. Plectoptera. (Mayfly.)
" 6. Thysanoptera. (Thrips.)
" 7. Hemiptera. (Bugs.)

Series 2.—*Holometabola*, or with a complete metamorphosis.

- Order 8. Neuroptera. (*Corydalus*, lace-wing fly, ant-lion.)
" 9. Mecoptera. (*Panorpa*, *Boreus*)
" 10. Trichoptera. (Caddis flies.)
" 11. Coleoptera. (Beetles.)
" 12. Lepidoptera. (Moths and butterflies.)
" 13. Siphonaptera. (Flea.)
" 14. Diptera. (Mosquito, fly.)
" 15. Hymenoptera. (Saw-fly, ant, wasp, bee.)

Fossil Insects.—About 3,000 species of fossil insects have been described, of these from 200 to 300 are Palæozoic, 500 Mesozoic, and the remainder are Tertiary. The oldest fossil insect remains is the wing of a supposed bug (*Protocimex*) from the Ordovician of Sweden. The wing of a cockroach (*Paleobattina*) has been detected in the middle Silurian of Calvados, France. From the Devonian shales of St. John, N. B., nine species of primitive net-veined insects have been collected. The coal measures are characterized by cockroaches, primitive dragonflies, May-flies, and grasshopper-like forms, phasmids, etc., also occurring. All of the Palæ-

ozoic insects known are very primitive. Modern forms, those having a complete metamorphosis, begin to appear in the Triassic and Jurassic, where remains of beetles, a saw-fly, and a moth occur. Ants, bees and butterflies date from the Oligocene and Miocene Tertiary.

Bibliography.—The latest general works on insects are Carpenter's 'Insects, their Structure and Life' (London, 1899), and Sharp's 'Insects' (Vols. V. and VI. of Cambridge Natural History, 1895-9); both contain sufficient references to other works. For American insects consult: Packard's 'Text-book of Entomology' (1898), and 'Guide to the Study of Insects' (1889); Comstock's 'Manual for the Study of Insects' (1895); 'Insects and Crustaceans' (Vol. II., Standard Natural History, 1884); Howard's 'The Insect Book' (1901). The last named contains a copious bibliography, especially to the voluminous publications of the Entomological Division of the U. S. Department of Agriculture.

See FRESH-WATER INSECTS; MARINE INSECTS, and the names of groups and species, as FLIES, HYMENOPTERA, MOTHS, etc.

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Insects and Flowers. See FLOWERS AND INSECTS.

Insects, Fungi Affecting. See FUNGI.

Insects, Injurious and Beneficial. See ENTOMOLOGY, ECONOMIC.

Insects, Propagation of Disease by. See FILARIASIS; FLIES; MOSQUITOES; MYIASIS, ETC.

Insessores, in-sé-só-réz, a discarded term in Ornithology designating a group styled "perchers," which included the majority of the smaller and more familiar birds. The term has been abandoned because the group denoted by it is a purely arbitrary one.

Insidious Flower-bug. See FLOWER-BUG.

Insolvency. In a popular sense the word insolvency applies only to persons without property or means sufficient to satisfy their creditors. The legal definition embraces all who are unable to pay their debts at maturity in the ordinary course of business, even though they may possess assets exceeding their liabilities. A failure to meet overdue obligations renders a person liable to proceedings against him in a court of insolvency, in which his assets may be taken into the possession of the officers, marshaled, and distributed to his creditors. Should there be an amount in excess of what is required to pay the creditors and the expenses of administration, the balance so remaining is the property of the debtor. From a very early period in the history of civil government, laws have existed providing for proceedings by creditors against insolvent debtors, by which the debtor's property could be taken from his possession, to be held by another as a trust fund to be applied to the payment of his just debts. In case of an insufficient amount to pay all debts in full, provisions are usually made for a *pro rata* distribution. These laws have generally provided for classes of preferred debts, payments of which were to be made in full, even though such payments exhausted the entire assets. Preferred claims commonly included all claims of the government or state, and often claims for labor to a limited

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amount, and claims for the necessities of life. Provisions are usually made for the exemption of certain articles to the use of the debtor, not to be included in the assets. The Constitution of the United States provides that Congress may establish uniform laws on the subject of bankruptcy throughout all the States, and the first act upon that subject was passed in 1800, since which time there has been some Federal bankruptcy law, with brief interregnum. A uniform national law upon the subject now exists. The first act of Congress upon this subject provided for proceedings by the creditors only, but in 1841 an amendment provided for voluntary proceedings by the debtor, by which he could surrender his property and obtain a discharge from all of his debts, provided he had been guilty of no fraud. In the absence of a national law on the subject of insolvency, the States all have authority to enact and enforce laws upon that subject. The Federal act now provides for voluntary proceedings by the debtor, as well as proceedings against him by the creditors, with provisions for his discharge. The various State acts have usually contained such provisions. The Federal act suspends all State insolvency laws during its continuance. See BANKRUPTCY LAWS.

Inspiration, in theology, the communication by the Holy Spirit, to writers and speakers, of a portion of the knowledge and feeling of God, in such fashion that they can be communicated to other men; especially used in relation to the Bible. On the fact of inspiration rests all attribution of divinity to the sacred writings above any others; but theories of its method and extent have necessarily changed with the advance of critical knowledge. They have never had an authoritative pronouncement even from the Church of Rome, which allows liberty of judgment on this; the Bible not holding the supreme place there as in Protestant bodies, and the latter being too divided for a credal statement on this point, by the very causes which call for one. All theories rest not only on the necessary implication of divine character in the Bible, but on two specific passages: 2 Tim. iii. 16: "All Scripture is given by the inspiration of God, and is profitable for doctrine" (Revised Version, "Every Scripture inspired of God is also profitable for teaching," which does not relinquish the claim of inspiration); and 2 Pet. i. 21, "Holy men of God spake as they were moved by the Holy Ghost" (Revised essentially the same). The Scriptures were the Old Testament.

The early Church did not generally dwell on theories of inspiration, regarding it as a passive "ecstasy" in which divine truth was communicated, but rarely going on to its effects on the inspired writings or the methods which produced them. Origen, however, the great builder of doctrinal framework, formulated an exact theory of "plenary" or entire inspiration, which preserved the writers from all faults of memory, and left no iota either incorrect or superfluous in Scripture. But others held that all believers were inspired in different degrees; as this made all believers infallible interpreters of the Scriptures, the perilous nature of such a doctrine led to the opposite one, that there was an inspired official depositary of interpretation as well as an inspired canon of writings. The mediæval schoolmen evolved the theory that

there were two kinds of inspiration in the Scriptures: direct, found where moral and doctrinal truths are directly taught; and indirect, in historical passages, whence ethical truths can only be derived by allegorical interpretation.

Regarding inspiration not as a purpose but a method, there are three explanations within the limits of orthodox Christianity: the "plenary" or verbal, the dynamic, and what may be termed the "irradiant" theories. The remaining one, which makes the inspiration only that common to all human beings — who are part of the divine mind — and having no part in any special revelation, is really not a theory of inspiration at all, as it holds that there is none; that all things are parts of the world's evolution, and the sacred writers and the Bible were evolved like the rest, though the latter is the greatest moral product of the world, and to be reverenced in the moral rank as we reverence the greatest writers and thinkers in theirs.

In the early uncritical ages of the Protestant churches, the universal and obvious theory of inspiration was the plenary. The original text of the Bible was dictated word for word by the Holy Spirit, the writers being merely penmen, or media on whom were impressed certain phrases, which must not be varied on peril of distorting the divine revelation. The words of Scripture thus transmitted are God's words, to each reader as if spoken directly to him by the Deity, and no matter to what subject they relate, be it doctrine or history, the origin of man or the duty of man. That there are different styles, corresponding to different writers, means only that God has accommodated his expressions to their natures, for his own utilities. Hence the least particle in the Scriptures is surcharged with meaning, and if anything seems in conflict with science, history, or other portions of the Bible, it arises from corruption of text, bad translation, or other change from the actual revealed language. This is the only theory with perfect logical continuity; unhappily it can only be maintained, in face of the increasing body of knowledge of texts, facts, and natural ethics, by those willing to abnegate their own right of criticism wholly in favor of their own infallible interpretation. Indeed, the chief argument for the latter is that the divine purpose would be defeated, if its intention in giving the revelation were made null by the misunderstanding of fallible human faculties.

The dynamic theory is the first step outside this bulwark enforced by the impossibility of maintaining verbal inspiration, and relegates the divine agency to an indirect function. In place of its dictating the exact phraseology and the precise facts, the writers are so filled with divine force that for all purposes of conveying the essential divine purpose, that of showing the truths of sin and danger and the path of salvation, they are a portion of the divine and incapable of error. Under this theory the writers are left a free hand, according to their own limitations and those of their age, in dealing with narrative facts or their own guesses at them; but are guided explicitly in all matters of faith and morals. In order to be received, the revelation had to be accommodated to the mental conditions of different ages; and men of each received guidance from God to present it so that it was true in relation to them, and remained so for all ages under all conditions. The war-

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rant of the Bible is its incomparable and super-human system of ethics, and its proof of divine origin is that evident superiority to all human devices.

The "irradiant" theory is a recent one, and a step farther from the old claim of entire divinity. In this view the record as such has no divinity, nor infallibility of any kind. There is a divine revelation, but it acts by generating moral ideas in certain great selected men, and which, once generated, are left to fight their way and take their chance like the other useful ideas of the world, and undergo disbelief and mutilation, with the certainty that according to God's purpose, truth will prevail at last. The proof of divinity in Christianity lies in the fact that its moral truths are the greatest in the world, and were original with it.

Instinct. Instinctive acts are those physiological activities in which mind or consciousness is involved. Instincts may be regarded as intermediate between simple physiological or reflex actions and acts of reason exhibited by man. Animals of a grade higher than sponges, polyps, most mollusks and other forms of a corresponding grade, have organs of sense, of perception, and in the higher vertebrates a brain and nervous system and other organs of the same type as those of man, and such animals react to something more than mere physical stimuli. We know by observation that the social insects, birds and mammals, at least those which have become domesticated, have sufficient intelligence to meet the ordinary exigencies of life, and that at times the ant, bee, beaver, elephant, dog, and ape can meet extraordinary emergencies, that is, rise with the occasion; that they may to a very limited extent be free agents; that they are not mere automata. It has been observed that the more intelligent animals are not solely guided by the physical stimuli of light, odors, etc., but that they exercise the power of choice, selecting this or that kind of food, this or that mate. Animals are subject to what we call the passions: they show anger, even when not hungry or under the domination of the reproductive instincts; their sounds express dissatisfaction or contentment. They possess memory; with its aid ants and bees find their way back to their nests.

Definitions of Instinct.—Descartes believed that animals are automata. It is popularly supposed that animals are automata, physiological machines in which have been implanted by supernatural power what we call instincts. This view is still insisted on by two excellent observers of the habits of insects, Favre and Wasmann, who claim that instincts are special innate or natural propensities, "transcending the general intelligence or experience of the creature." But of late years the impression has arisen and gained force that instincts are "innate" and "natural" because they have arisen by a natural process and have been gradually acquired and transmitted from one generation to another.

Erasmus Darwin held that instincts were the result of imitation by young animals of the actions of their parents. This view is still held by Wallace, and, as Eimer claims, the power of rapid learning has played a part in the evolution of certain instincts. Thus the fox or rat learns from its parents, and becomes more cunning or

sagacious with age and training. Lamarck practically regarded the lowest animals as automata, but in the higher animals, that is, those with a nervous system, we have instinct. "Hence, instinct in animals is an inclination which necessitates that from sensations provoked while giving rise to wants the animal is impelled to act without the participation of any thought or any act of the will." To satisfy these wants they contract different kinds of habits; these are transformed, he says, into so many propensities, from which "originate their habitual actions, and special propensities to which are given the name of instinct." He then adds that the same habits and the same instinct are perpetuated from generation to generation, "without offering any notable variation, so long as it does not suffer change in the circumstances essential to the mode of life." He thus intimates that instinct may vary, and he states that in birds and mammals instinct is variable.

Darwin does not give a formal definition of instinct, but after stating that several distinct mental actions are commonly embraced by this term, he adds that "a little dose, as Pierre Huber expresses it, of judgment or reason often comes into play, even in animals low in the scale of nature." He calls attention to the points of resemblance between instincts and habits, showing that habitual action may become inherited, whence it results that "the resemblance between what originally was a habit and an instinct becomes so close as not to be distinguished." He concludes that, by natural selection, slight modifications of instinct which are in any way useful accumulate, and thus animals have slowly and gradually acquired through successive generations, their power of acting instinctively, and that they were not suddenly or specially endowed with instincts. Herbert Spencer defines it as compound reflex action, and also as "a kind of organized memory," arguing that instinctive actions grow out of reflex, and in time pass into intelligent acts. Romanes defines instinct as "reflex action into which there is imported the element of consciousness." Lloyd Morgan also says: "It is a bit of animal automatism not necessarily involving more than the lower brain centres," but it is a bit of automatism accompanied by a consciousness in a broad sense. "The role of consciousness in a chick's pecking is to select the adequate responses, and to steady the muscular mechanism to its work." As the result of recent experiments Loeb regards instincts as inherited reflexes so purposeful and so complicated in character that nothing short of intelligence and experience could have produced them. Packard gives the following definition: "The sum of inherited reflex acts, becoming habitual and arising from blended reflex and subconscious though involuntary acts, performed at birth or through life blindly, without practice or previous experience, effort, training or thought."

Examples.—It should be understood at the outset that instincts in animals are fundamentally connected with the means of obtaining food, or with reproduction, the latter involving care for the young, as in egg-laying, the selection of a nesting place by insects and birds, the construction of the nest, and the defense of the young, and in the birds and mammals the training of the young to fly, or to hunt for prey.

Reflex acts are simply physiological responses

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to external physical stimuli, as muscular irritability, the different tropisms, such as response to odors, and other chemical properties, to cold, heat, etc. Many of the movements of the lowest animals, as the protozoa, sponges, polyps, worms, etc., their modes of selecting and getting food, of escaping their enemies, are scarcely more than reflex. As examples of instinctive acts are those of very young chicks. Morgan regards as instinctive in these birds the act of "pecking, walking, scratching themselves, preening their down and feathers, stretching up and flapping their wings, squatting down and dusting themselves, scattering and crouching when alarmed, uttering the danger-warning *churr*, and other sounds." Young ducks afford examples in the way they "seize and mumble their food in the bill, their aptness in swimming directly on leaving their shell, piping, and smoothing the down of their breast with their bill."

It is when we observe the complicated nesting habits of the spiders, and of the social insects such as ants, wasps, bees, as well as those of birds and the muskrat and beaver, when such striking and inexplicable forms of intelligence arise that we become perplexed how to explain them. Thus take the mode in which the honey-bee builds its cells. Is it simply mechanical, the result of several bees working together, and due to the mechanical pressure of the insects against each other during the formation of the cell? While some contend that if left alone to build a single cell, this would probably be round, others show that a solitary wasp will build its cells in very regular hexagons. It is now conceded by Darwin, Romanes, and others, that the process is not a purely mechanical one, but is "constantly under the control of intelligent purpose." It is most probable that the hexagonal-cell building instinct is the result of habits which gradually arose, and which became fixed by heredity. In birds the modifications sometimes occurring in the shape and situation of their nests show that their instincts are, owing to change of conditions, plastic, reason teaching them to modify their nests so as to adapt them to new conditions. Experience and intelligence lead to such changes. The beaver manifests in his works intelligence and reasoning capacity, both in the construction of dams, canals, and in the mode of felling trees, and in the use in certain localities of "slides." In the monkeys and apes we apparently have the nearest approach to human intelligence, judging by the instances narrated by Romanes. Were it possible to breed apes for many successive generations more light would be thrown on their psychology. Meanwhile many acts performed by the domestic animals, the horse, dog, cat, elephant and even the pig, and their susceptibility to be trained, show that they may often act intelligently, and are prompted by a low degree of reason.

Instincts Variable and Sometimes at Fault.—Lemmings in their migrations, impelled by their instincts to go ahead, will swim out into the sea and be drowned. Ants will store up beads instead of seeds, and there are many instances where instinct is at fault. Certain instincts may also by change of the environment become directed into new channels. This is illustrated by numerous cases of insects, reptiles, and mammals which have become adapted to an aquatic life. An entire new crop of habits and instincts may thus arise. The instincts of young animals,

particularly of larval forms, caterpillars, grubs and maggots, are of a different description from those of the pupa state, and more especially of the adult state. In fact, instincts are pliable, variable, and in certain cases may lapse altogether, to be replaced by a new set. Were this not the case we should have no progress in the evolution of life. The more generalized animals have vastly less intelligence than the highly specialized forms. Compare the instincts of so complex a being as the ant, or wasp, or bee, with that of the locust or bug, or the instinctive and intellectual acts of social insects, with their wonderful differentiation of the individual into workers of different castes and the normal and supplemental males and females. Such are what are called complex instincts, and they are all brought into action through the principle of the division of labor.

Do Animals Reason?—Lloyd Morgan observed that the chick rapidly profits by experience after a few practical trials; hence he concludes that intelligence is founded on experience. He allows that chicks have intelligence, this involving the association of impressions and ideas, and the power of making a choice. He then asks the question, "Do animals reason"? "Do they focus the therefore"? "Do they think the why"? Probably not. Reason is not (as animals "reason") adaptation; they do not profit by experience of actions to varying circumstances. Hence, he thinks that animals probably do not reason as man is capable of reasoning. Here might be quoted Herbert Spencer's definition: "Reason or intelligence is the faculty which is concerned in the intentional adaptation of means to an end." Finally, it is safe to assume that the higher animals, especially the domestic animals, which have been in contact with and more or less trained by man, exhibit the germs of reason, and while they cannot make inductions and deductions or predictions, their intellectual acts differ rather in degree than in kind from those of the lowest human races.

Consult: Romanes, 'Animal Intelligence' (1883); 'Mental Evolution in Animals' (1884); Morgan, 'Animal Life and Intelligence' (1890-1); 'Animal Behavior' (1900); Loeb, 'Comparative Physiology of the Brain' (1902).

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Institute of France, a learned body organized after the first outbreak of the French Revolution, during which all the academies of learning and arts in France had been suppressed. It was formed by the decree of 25 Oct. 1795, to replace the Académie Française, the Académie des Sciences, and the Académie des Inscriptions et Belles-Lettres. Its object was the advancement of the arts and sciences by continual researches, by the publication of new discoveries, and by a correspondence with the most distinguished scholars of all countries, and especially by promoting such scientific and literary undertakings as would tend to the national welfare and glory. The Institute was composed of a number of members residing at Paris, and an equal number of associates in the different parts of the Republic. Each class could also choose eight learned foreigners as associates. It was at first divided into three classes, each of which was subdivided into several sections. The first class embraced the physical and mathematical sciences,

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the second the moral and historical, and the third literature and the fine arts. The number of active members, exclusive of the associates, was limited to 144. The Institute received, however, its final organization by a decree of 23 Jan. 1803. It was then divided into four classes: (1) the class of the physical and mathematical sciences, consisting of 65 members; (2) the class of the French language and literature, consisting of 40 members; (3) the class of history and ancient literature, of 40 members; (4) the class of the fine arts, with 28 members. A royal ordinance of 21 March 1816, restored the former names of the classes, so that the name of Institute was applied only to the whole body collectively. The same ordinance assigned the first rank to the Académie Française, as being the oldest; the next rank to the Académie des Inscriptions et Belles-Lettres; the third to the Académie des Sciences; and the last to the Académie des Beaux-Arts. These united academies were under the personal direction of the king, and each had an independent organization. To each academy were attached 10 honorary members, who had merely the right of being present at the meetings. In 1832 the old class of Sciences Morales et Politiques was reconstituted as a separate academy, so that there are now five academies.

The Académie Française had for its chief object the cultivation of the French language, and was charged with the composition of a French dictionary, the merits of which have been often disputed and its plan condemned. The disposal of its vacant chairs has not always been regulated by the best taste and judgment, Descartes, Pascal, Molière, La Bruyère, J. J. Rousseau, Balzac, Dumas père, Daudet, and Zola having been rejected, while in former times many a shallow court favorite was accepted.

The Académie des Inscriptions et Belles-Lettres has 40 members, 10 free academicians, and 8 foreign associates. It has 40 correspondents at home and abroad, and devotes itself chiefly to subjects of a historical nature. The most distinguished scholars, both in and out of Europe, are, or have been, connected with it. Committees of this academy superintend the erection of public monuments and the preservation of those already in existence. Works brought out under its auspices are: 'Histoire littéraire de France,' 'Recueil des Historiens de France,' and 'Corpus Inscriptionum Semiticarum.'

The Académie des Sciences has for its province the various branches of knowledge connected with the physical and mathematical sciences, natural history, medicine, etc., there being in all 11 sections. It has 66 members, 10 free academicians, and 100 correspondents. The number of foreign associates is limited to eight.

The Académie des Beaux-Arts has 40 members, 10 free academicians, 10 foreign associates, and 61 correspondents. A committee of this academy was charged with the publication of a dictionary of the fine arts.

The Académie des Sciences Morales et Politiques, has 40 members, 10 free academicians, 6 foreign associates, and 48 correspondents.

Members of the Institute of France are elected for life by ballot, and have an annual salary of 1,500 francs.

Institute of Social Service, American. See SOCIAL SERVICE.

Institutional Church, a non-creedal organization of Christians, to supplement the regular church methods and ministrations—preaching, prayer-meetings, Sunday school, and pastoral visitations—by helpful social work in the community. The moving spirit is the same as in the Y. M. C. A., University Settlement, Salvation Army, Rescue Missions, Christian Endeavor societies, etc.; but "with the emphasis on Church, not Institution." The prime object is to reannex to the church the functions which other bodies have been compelled to fill by its neglect of its duty; and strengthen it by gathering potential Christian elements which under the old system do not come to it, as well as by combining in itself all the claims to public gratitude and interest now shared between the purely ecclesiastical and the purely social institutions, or the half-way houses like the Y. M. C. A. It differs from the latter in not merely furnishing a religious atmosphere which may lead to church membership, but enrolling members at once in a real church of Christian work by absorbing the secular features of the other; in a word, to do, without vows or uniforms, what the Catholic Church has always done with its charitable functions—make them an integral portion of the church organization. Hence, it is not by itself a church in the sense of the Roman Catholic or the Methodist Church, but in a broad sense a description of any church which adds educational or social work; in general use, a title of any which throws into this work its predominant vitality. Free pews are an essential accompaniment, as the social aristocracy fostered by rented pews contradicts the basal democratic principle of institutional work; hence it is sometimes called Free Church, but preferably Open Church. The present name originated with President Tucker of Dartmouth College, who applied it to Berkeley Temple, Boston.

The movement started chiefly with the High Church element in England, modeled on the Catholic idea; it flourished for two generations in that country before reaching the United States, about 1880, and it has hardly been a vigorously spreading one here for above 15 years. Now, however, a large number of churches—Episcopal, Congregational, and Baptist in the forefront, but also Methodist, Presbyterian, Unitarian—have adopted the idea with increasing vigor, besides the work of this class always performed by the brotherhoods and sisterhoods of the Roman Catholic Church. One of the earliest of these was Plymouth Church of Indianapolis, inspired by the memory of Mr. Beecher. Notable among others are the St. Bartholomew, St. George, St. Paul, and Judson Memorial of New York, and the Tabernacle of Jersey City; Berkeley Temple, Parker Memorial, and Ruggles Street Baptist of Boston; Grace and Bethany of Philadelphia; Ninth Street of Cincinnati, Pilgrim of Cleveland; Plymouth Tabernacle of Detroit; People's of St. Paul; and the Denver Tabernacle. In 1894 the Open and Institutional Church League was organized in New York; it held several conventions in Eastern cities (1895–1901), and for three years published the 'Open Church' as its organ, but has practically lapsed, being merged in the 'National Federation of Churches and Christian Workers.' The total of its work, however, is not shown by its nominal member-

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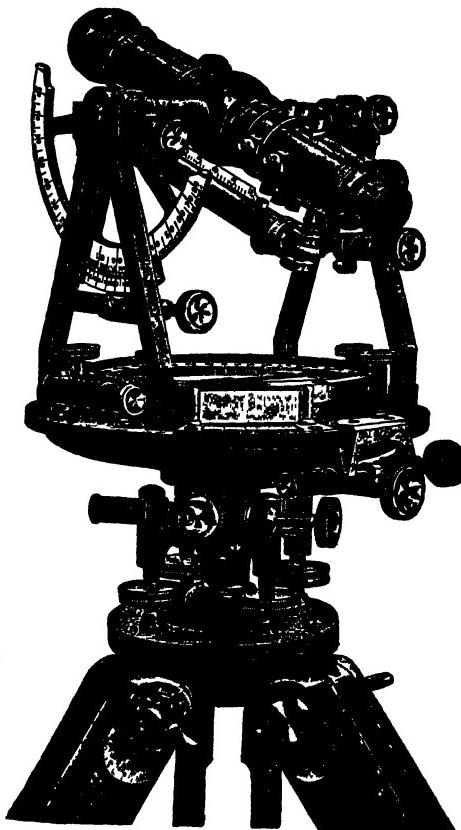
ship; the same spirit has infected outside churches, and their methods are being more and more adopted as a general basis of work.

The platform of the League stated that it aimed to save all men by "abolishing, so far as possible, the distinction between the religious and the secular"; by "open church doors for every day and all the day, free seats, a plurality of Christian workers, the personal activity of all church members, a ministry to all the community through educational, reformatory, and philanthropic channels, to the end that men may be won to Christ and his service, that the Church may be brought back to the simplicity and comprehensiveness of its primitive life." It is not correct to say, as is often done, that its methods are purely secular: its *additional* methods beyond the regular religious ones are so, for the very reason it exists. These involve a thorough organization for social and philanthropic work; but the religious features are sedulously conserved and carefully fitted to the work, the spirit of worship being cherished and made the centre of inspiration. The service generally ends in the communion; there is congregational singing of both hymns and chants, led by a highly trained choir, and often responsive readings; the whole with the sermon are intended to be brief, varied, and attractive. Sunday schools are carefully attended to; prayer meetings given new features; in summer there are open-air meetings; and other Christian associations, endeavor societies, brotherhoods, etc., are encouraged. The officers and workers of the church are given active special duties, such as pastoral visiting, reception and welcome of strangers, canvassing for the various activities of the church; and there are not only sub-pastors, but deaconesses, sisters, and nurses. The purely secular side embraces all departments of culture, physical, intellectual, and moral, as well as direct charities. Morally, the church work above should be sufficient. The charitable departments include not only direct aid to the poor, but wood-yards, employment bureaus, etc.; personal endeavor to provide employment for those willing to work; dispensaries, hospitals, and crèches; and encouragement to thrift by savings funds. Special buildings are often erected.

That the movement is liable to perversions is admitted; such is the case with every institution. Secularization is one; but unless it can be faced, the churches cannot influence or draw in those outside them, for the simple reason that the latter cannot be brought within hearing. Sensationalism, to draw in hearers to be benefited, is a graver one, and ill-judged; as one of its chief workers puts it, "a camp-stool congregation neither pays nor repents," and a lasting work must be content with slower processes.

Instruments, Engineering. To attempt a definition of an engineering instrument is hardly practicable, as the wide range of departments into which the profession is now divided demands so many special appliances for their requirements that no one description is possible, and an extended catalogue is inadmissible within the limits of this article. The earliest known engineering instrument was the Dioptra of Hero of Alexandria, 130 B.C., although rude appliances must have been used long before that time by

the ancient engineers in the construction of the public works of Chaldea and Egypt, the ruins of which even now awaken our admiration and wonder. It was not, however, until the beginning of the 19th century that the great impulse to the construction and use of engineers' instruments was given by the advance of civilization and commerce incident to the application of steam as a motive power on sea and land. Since that time great advances have been made not only in the design and accuracy of engineering instruments but also in the invention of new instruments for the many purposes required by engineers in the construction of railroads, canals, bridges, harbors, etc.



The characteristics of engineers' instruments differ in the various nations as the requirements of engineering practice, and thus American engineers' instruments possess a distinct character of their own as compared with other nations, having as a rule few parts and lightness of construction combined with great strength and an adaptability of parts for the special service required. It is not the purpose of this article to attempt a description of the various instruments used by engineers—this may be found in the article SURVEYING—but to give the reader a general idea of their construction. The metals used in the construction of engineers' instruments are principally the alloys of copper and tin with small quantities of silver, aluminum, and German silver. Great care must be constantly exercised that these substances be

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free from iron or other material which would affect the magnetic needle. In the construction of an instrument such a distribution of the metals is aimed at that the greatest strength consistent with light weight may be obtained and that the metals coming into contact at the bearing surfaces may be of such varying composition as to cause the least friction.

Take, for the purpose of better illustration, an American transit, illustrated herewith, as typical, as far as the construction is concerned, of nearly all engineering instruments. The plate of the instrument on which the magnetic needle is mounted, or, as it is termed, the compass circle, is turned with great care so that the surface may be absolutely true, and is graduated usually into 720 spaces, each representing one half of a degree.

Compass circles are usually figured in quadrants of a circle, that is, from 0 at the point marked "N" or "North" to 90 and back again, while the figuring of the limb varies with the custom of the maker or the requirements of the engineer.

In engineers' instruments, however, the angular measurements are made usually without the use of the needle, by a telescope so mounted as to revolve in a vertical or a horizontal plane. The angular measurement of its movement being indicated on circles divided into fractional spaces of a degree and read for convenience to finer spaces by one or more verniers. Accuracy of graduation of the compass circle, and especially of the limb, is essential to the perfection of the instrument, and great pains are taken by manufacturers in perfecting and improving engines for graduating. The best machines are automatic in action and the spaces are so accurately laid off that there is no appreciable error in the finished work. The instrument rests on the socket or bearing surface to which the compass plate and limb are attached; the surfaces of the socket must be so accurately fitted together as to produce no error when the parts are moved on each other. The socket is mounted on a leveling head, which is actuated by three, or in the usual American practice, by four leveling screws, as shown, by means of which the instrument can be accurately leveled. Upon the compass plate are placed the standards which support the telescope, the preparation of the optical parts of which is next in importance to the fitting of the socket and the graduation.

The telescope consists of an eye piece and object glass mounted in a tube. The eye piece is simply a magnifier of the image produced at the focus of the object glass. Two kinds of eye pieces are used, one showing the image erect, and the other showing the image inverted. The object glass is composed of two plates of optical glass of such specific gravity and refractive index that it will magnify the image clearly without prismatic colors. To secure achromatism the two parts of the object lens are made the one of crown and the other of flint glass, the crown being a light glass of soda and silica and the flint being a heavier glass containing potash and lead. The surfaces of each are curved to such a degree that the rays of light entering the object glass may be properly refracted and concentrated at a point called the focus.

The making of the lenses is an operation

requiring much skill in manufacture, as upon the accurate grinding of the curved surfaces depends the quality of the telescope.

At the focus of the object glass are placed the cross-wires, which are filaments of spider web or very fine platinum. In conjunction with these are often used two more wires commonly called stadia wires, so placed that they intercept on a rod a space proportional to its distance from the instrument, thus furnishing an efficient method of ascertaining distances directly by the observer. The metal parts of the instrument, having been prepared, are polished with some suitable material, a preparation of rouge being generally used for finishing the surface of the screws, and the larger surfaces being finished with fine emery paper. The larger parts are usually colored dark to avoid reflection of the sun, while the smaller ones, such as screws, etc., are left bright in order that there may be a pleasing contrast between the different parts of the instrument. The parts, prepared as above, are covered with a thin coat of lacquer, a preparation of shellac and alcohol, applied after heating. All the parts are assembled and fitted together, and the instrument is then ready for the final complete adjustment. This consists in fitting the sockets so that they will move freely on each other, placing the compass plate and limb in position on the sockets, making the limb truly concentric with the socket and placing the vernier in position. The telescope must be so adjusted that its parts may work freely, and having been supplied with optical parts, etc., it is then fitted to the standards or supports previously placed in position on the compass circle. The whole instrument is then tested for accuracy and if found correct is packed in its case and is ready for use.

The above description is only intended to give a general idea of the construction of a typical instrument, but in the same methods will practically apply in the construction of all engineering instruments, such as levels, plane-tables, the various kinds of compasses, etc.

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In'sulator, a body used to separate an electrified conductor from other bodies, and which offers great resistance to the passage of electricity. Glass, shellac, resins, sulphur, ebonite, gutta-percha, silk, and baked wood are notable insulating materials. Wires in which currents of electricity are passing are often arranged in coils. To prevent the lateral passage of electricity from one coil to another, the wires are usually covered with silk and shellac. Insulators on telegraph poles, to which the wires are attached, are usually made of porcelain, glass, or stoneware. Underground telegraph wires are usually of copper, insulated by means of a coating of gutta-percha or india-rubber, and protected by tape or iron wire, metal tubes, or wooden troughs filled with bitumen. The core of a submarine cable consists of a copper wire insulated by a covering of gutta-percha whose weight is greater than that of the wire. See *ELECTRICITY (Conductors and Insulators)*.

Insur'ance, a contract by which one party, for a stipulated consideration, undertakes to indemnify or compensate another party against loss by certain specified risks. The

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party undertaking to make the indemnity is usually called the insurer or underwriter, the other the insured or assured; the agreed consideration is termed the premium; the written contract, a policy; the events or causes of loss insured against, risks or perils; and the thing insured or the subject to be protected, the insurable interest. Marine insurance relates to property and risks at sea; insurance of property on shore against fire is called fire insurance; life insurance, in its widest sense, is a contract entered into by the insurer to pay a certain benefit contingent upon the duration of one or more lives. Besides these classes of insurance there are many others; the traveler may insure himself against loss entailed from damage by rail or sea; the farmer from the inroads of disease among his live stock; the employer from the fraud of a dishonest cashier, etc.

The practice of marine insurance seems to have long preceded insurances against fire and upon lives. It is impossible to state the precise period of its introduction, but it is probable that it dates from about the beginning of the 15th century; though it is contended, on the authority of certain ancient writers, that traces of this form of insurance are to be found among the Romans. Some Anglo-Saxon guilds insured their members against loss from fire, water, robbery, etc. Commercial insurance, however, seems to have originated in Flanders about 1300, although priority is claimed for both Italy and Spain. It is probable that insurance was introduced into England by the Lombards early in the 16th century, but few court cases pertaining to it are found till the middle of the 18th century.

In Great Britain fire insurance has been practised for over two centuries, but on the Continent its introduction dates considerably later. The history of life insurance, as well as that of various other forms now in practice, belongs to a still later time. For the history and development of the principal insurance systems in this country, see INSURANCE, MARINE; FIRE INSURANCE IN AMERICA; INSURANCE, LIFE, IN AMERICA; INSURANCE, FRATERNAL.

Insurance, Accident. See ACCIDENT INSURANCE.

Insurance, Casualty. The definition of the word casualty is, "chance, or what happens by chance; accident; contingency; an unfortunate chance or accident, especially one resulting in bodily injury or death," etc. The term Casualty Insurance is commonly held to include those forms of indemnity providing for payment in case of bodily injury or death, or for loss or damage to property (except from fire or the elements), resulting from accident or some other such unanticipated contingency. The four great headings into which this insurance is usually divided are Personal Accident, Liability, Steam Boiler, and Plate Glass.

Personal Accident Insurance.—The first of these to be introduced into this country was personal accident insurance which had flourished, in a limited way, for many years in Europe, but was not attempted here until 1863. The pioneer of accident insurance in America was James Goodwin Batterson of Hartford, Conn., who, while traveling in England in 1859, learned of accident tickets insuring against injuries or death resulting from railway accidents

and purchased one of these tickets in going from Leamington to London. Being at once impressed with the possibilities of developing this idea to include all forms of accidents in place of travel accidents only, he consulted with many well-known English insurance experts on the subject, all of whom with the exception of the famous statistician, Walford, expressed grave doubts as to the feasibility of the scheme. However, Mr. Batterson came home determined to make the experiment and in 1863, the first American accident insurance company was organized at Hartford, Conn. There is reliable authority for the statement that the first contract made by this company was a verbal contract entered into by the president of the company with a citizen of Hartford, whereby in consideration of a premium of 2 cents, the company agreed to become liable in the sum of \$5,000 in case of accident to the assured while journeying from the post-office to his home on Buckingham Street. The second contract was a more formal one and was issued in consideration of \$2 to protect the assured against loss of life or personal injury while journeying from Hartford to Washington, D. C., and return.

An accident policy is a contract of insurance against loss of life, limbs, sight, or time through bodily injuries effected solely by external, violent, and accidental means. The full amount of the policy is payable in case of death, or for the loss of both hands or both feet, or both eyes, or one hand and one foot. Proportionate amounts are payable for the loss of one hand or one foot or one eye, and a fixed sum is payable per week during the term of temporary disability.

The first rates, based upon the statistics of the English companies proved inapplicable to American conditions and accident insurance had a hard struggle to obtain a legitimate foothold on American soil. However, a series of catastrophes by land and sea in the following two or three years emphasized the importance of this form of protection, and little by little the business became more firmly established. During this time about 70 companies started, but all either failed or were absorbed by the pioneer company, which held the field for many years alone.

Gradually, however, other companies were organized, each newcomer profiting by the experience of its predecessors until on 1 Jan. 1904 25 stock companies were writing accident and health insurance in the United States, with aggregate premiums amounting to the enormous sum of \$13,337,000. The first accident policies were very primitive affairs compared with the elaborate and almost unlimited contracts of today. In the early times, policies covered merely loss of life, limbs, or total disability, conditions were numerous and technical, and policies for small amounts were the rule. Gradually, however, the competition of progressive and aggressive underwriters made itself felt in the broadening of the contract. One of the first important changes consisted in extending the period of weekly indemnity from 26 to 52 weeks. Some of the more conservative companies hesitated for a long time to follow this lead, but the pressure proved too great and they were finally forced to acquiesce. The policies of the leading companies have now reached the limit of liberality on this point by providing for the payment of weekly indemnity in a sum equal to the prin-

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cipal sum insured. One of the important innovations was the introduction of the combination policy, covering not only all of the features of the regular policy, but giving double benefits for accidents happening in or on a moving conveyance using steam, electric or cable power and provided for the use of passengers. This clause was later extended to include accidents in elevators and burning buildings, as well as in any vehicle used as a carrier of passengers, such as carriages, coaches, omnibus lines, and the like.

During this period of evolution, other changes were taking place. Conditions and agreements, that for years had been considered indispensable, began to disappear one by one. The fundamental theory that accident insurance was indemnity for loss of income, resulting from total and absolute disablement, was qualified by the broader and more flexible rule of partial disability, whereby a varying percentage of the weekly indemnity called for by the policy became payable in case the assured was not totally disabled, but was partially prevented from attending to his business duties. This payment was fixed at 50 per cent by some companies, irrespective of the nature and extent of the partial disablement, whereas other companies adopted what may seem to be a more logical basis, providing for not less than 25 per cent, nor more than 75 per cent of the weekly indemnity, depending upon the special circumstances of each case. Other important concessions were made by the elimination of conditions that had been deemed a *sine qua non* to the safe and proper conduct of the business. One of the principal of these conditions was that "injuries, of which there is no visible mark on the body, the body itself in case of death not being deemed such a mark," were not covered by the policy. Others were the exclusion of accidents from "sunstroke or freezing; from injuries intentionally inflicted upon the insured by himself or by any other person, injuries from unprovoked assault excepted; from voluntary over-exertion; violating law; violating rules of a corporation; voluntary exposure to unnecessary danger, expeditions into wild or uncivilized countries," etc. Many of these exceptions were reluctantly abandoned by the companies, often-times only after long and expensive litigation, the result of which was usually against the company.

The policies now issued by most of the companies are entirely free from all of the above-named conditions and are practically "conditionless," save as to the methods of reporting and adjusting claims. It was, however, not until 1899 that the most radical innovation yet to be introduced into the business of accident insurance was brought forward in the shape of health and disability insurance. It was perhaps but the logical sequence of events that after perfecting the accident policy to the point of the greatest liberality, the demand should make itself felt for insurance against "all the ills that human flesh is heir to" and underwriters in America again turned to their European neighbors, who had already taken the initiative. Sickness policies had become quite widely introduced into many Continental countries before that time and the system of compulsory insurance against accidents and sickness had been successfully instituted by many European governments. It is true that as early as 1847 sick-

ness insurance was attempted in America, by the organization of companies in Massachusetts and Pennsylvania, but these companies, after brief and unprofitable careers, gave up the struggle, and nothing further was attempted in this way until about the year 1896. At this time a rider to accident policies, covering about eight diseases, was adopted by one or two companies. However, the statistics available on sickness insurance did not make the business appear very attractive, and hence, during the first year or two after its general introduction into the United States, few companies were prepared to assume the risk and then only from a limited number of diseases, about 15, comprising a few of the more prevalent forms, the balance being contagious and rare diseases. Soon, however, competitors entered this field and the number of diseases covered was increased to 30, and upwards, until finally all ordinary diseases were included under the policy. At first, a health policy was not issued alone, but was combined with the accident contract, the two constituting disability insurance. Many of the leading companies still adhere to this practice; others issue the so-called unlimited health policy alone, but do not write the limited health contract, which covers a specified list of about 30 diseases, except in connection with an accident policy, while a very few companies still issue either form of health contract separately.

The introduction of disability insurance was the signal for a still further broadening of the benefits and conditions under accident contracts. The most important of these benefits are the "Schedule of Operations," providing for a fixed sum, in addition to weekly indemnity, to cover the cost of a surgical operation for any of the injuries listed in the schedule; the "Schedule of Indemnities" providing for a specified sum to be payable in lieu of weekly indemnity for any of the injuries enumerated, and the "Accumulation Table" providing for a 10 per cent increase in the principal sum insured on each annual renewal until this accumulation amounts to 50 per cent of the original sum.

A startling innovation in the year 1903 consisted in the insurance of the beneficiary, without extra charge, in addition to the policy holder. This was limited, at first, to indemnity for loss of life from travel accidents, including accidents in elevators and burning buildings. However, this was extended in 1904 to cover loss of limbs as well, from accidents above described. It is difficult to predict what limit will be reached by the companies in the eager contest for business, unless a standard policy is adopted by agreement or through legislative enactment.

The figures for 10, 20 and 30 years of premiums written and losses paid, give some astonishing results. From 1873 to 1883, premiums amounted to \$11,029,385 and losses to \$4,221,616. From 1883 to 1893, premiums were \$30,997,822 and losses \$13,904,155, or an increase of 181 per cent in business and of 229 per cent in claims. From 1893 to 1903, premiums amounted to \$64,832,874 and losses to \$28,686,686, or an increase of 109 per cent in business and of 106 per cent in losses over the previous 10-year period, and an increase of 487 per cent in premiums and of 580 per cent in losses over the first 10-year period. These figures speak eloquently of the enormous strides already made by accident insurance in America, and are but a forerunner

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of the growth and development that can reasonably be expected in the future.

Liability Insurance.—Liability insurance is of comparatively recent origin, and was unknown in America prior to 1887. As in the case of accident insurance, the business was first exploited in Europe, and its real development began after the passage of the English Employers' Liability Act of 1880. From time immemorial, the liability of employers for injuries caused by or suffered by their employees in the course of employment has been a part of the Common Law of all civilized nations. An eminent authority states that, as early as 1500 B.C. the Jewish law provided that "if a master were the means of causing the loss, either intentionally or unintentionally, of the eye or of the tooth of his slave, he was bound to let him go for his eye or his tooth's sake." And again, according to this same law, "if an employer allowed his ox to gore either his servant or a stranger, he was required to pay various compensations to the injured if he survived, or to his relatives in the event of the injury being followed by death."

Under the Roman law, a master was responsible not only for injuries suffered by his employees if due to his own negligence, but under the legal maxim, "*Respondeat Superior*," was liable for any personal injury sustained by a third person, due to the wrongful acts or omissions of his servants, acting as such and within the regular scope of their employment. The legal obligation to employees was expressed in the maxim, "*sic utre tuo, ut alienum non laedas*"; but the rule became subject to two important exceptions; firstly, that if the person injured and the one causing the injury were fellow-servants, the master was relieved from liability for the injury; secondly, under the doctrine of "*volenti non fit injuria*," if the person injured had actual knowledge or the means of knowing of and understanding the hazards incident to the employment and then voluntarily accepted the service, he was deemed to have assumed all the usual and ordinary dangers of the work and in case of injury, resulting therefrom, no recovery could be had against the master.

The passage of the Liability Act of 1880 by the English Parliament resulted in the organization of a number of companies for the protection of employers against the provisions of the act as well as against the expenses of litigation arising out of claims and suits instituted by employees for injuries sustained.

In 1887, the State of Massachusetts passed an Employers' Liability Act, fashioned to a great extent after the English statute, but with such changes and modifications as were necessary to suit the changed conditions.

One of the English companies then in successful operation abroad, deeming the time opportune to extend its field to America, determined to establish an American office and selected Boston, doubtless because of the existence of the act above referred to. It is stated that the local agency for the American branch was offered to various prominent insurance agents of Boston, but was declined by each in turn, as both the company and the class of business were unknown and there appeared to be no demand whatever for the kind of indemnity offered by the new-comer. It later became evident,

however, that liability insurance had come to stay, and within the next few years a number of American companies were incorporated to carry on the business, and several foreign companies established American offices on somewhat the same lines as the first company had done.

During this early period, the business was entirely experimental and rates were constantly altered to suit the changing conditions, as they arose in the development of the various features of the insurance. At the outset, the indemnity was limited to employers' liability, under substantially the following form of contract: That the company, in so far as regards fatal or non-fatal injuries to any employee or employees of the insured at the place or places mentioned in the application, during the period covered by the premium paid or by any renewal premium, would pay to the insured or his legal representatives all such sums for which the insured might become liable in damages not exceeding the limits of liability stated in the policy, such payments to be made within one week after the receipt by the company of satisfactory proofs of claim. Soon, however, the insurance was extended to public or outside liability, whereby the insured was indemnified against loss in damages on account of common law or statutory liability for personal injuries suffered by any third person and due to the business operations of the insured or of his sub-contractors. This contract was limited for some time to contractors and builders, but gradually the demand arose for similar protection on the part of owners and lessees of buildings, which resulted in the further broadening of the insurance scheme to include general liability. This contract, briefly, provided indemnity to owners or occupants of hotels, apartment houses, office buildings and wholesale and retail stores "against claims for compensation for personal injuries to any person or persons whomsoever for which the assured may be legally liable, resulting from accident (fire excepted), happening to such person or persons on or about the premises of the assured, or caused by any of the horses or vehicles of the assured used in his or their business." It was further provided, that, subject to the limits of liability expressed in the policy in respect to any accident which should cause death or injury to any one person or to several persons, "the company will pay to the assured or his legal representatives, within one week after the receipt by the company of satisfactory proofs of claim, all sums for which the assured shall become liable for personal injuries caused and limited as aforesaid, during the period covered by the premium now paid or by any renewal premium, by virtue of the common law or any statute."

It was a comparatively short step from this contract to the issuance of separate policies, covering liability for injuries caused solely by horses and vehicles, known as teams insurance, and for injuries caused by elevators, known as elevator insurance. Meantime a few of the companies were engaging quite freely in the insurance of common carriers' liability, covering "any and every accident to or caused by the cars, horses, plants, ways, works, machinery or appliances" used in the business of steam or street railroads, steamships, steamboats and ferries. It is but proper to say that this feature of liability insurance was

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looked on very unfavorably by the more conservative companies, and one of the companies engaging in the business notified its agency force after the disastrous results of this underwriting became first apparent in 1893 that, "we are not now seeking to push these specialties, as we find competitors (particularly companies whose managers have a commission interest), doing such business at rates which can only be productive of serious loss. Railways we take only when the lines are short, and street railways not at all in great cities." But the handwriting was already on the wall, and in November 1893 one of the largest and most important companies was forced into bankruptcy, largely through the losses sustained on common carriers' liability. This placed almost an embargo on that class of business, only two or three companies continuing to issue such policies. Two of these later discontinued the business entirely, and the other, after a somewhat meteoric career, collapsed in 1897 with heavy liabilities and few assets. In March 1896 the first significant action was taken with a view of placing liability insurance upon a sound scientific underwriting basis in the shape of a conference of the leading companies held in New York. After a series of meetings and discussions extending over a period of several weeks, an organization was effected known as the Conference of Liability Companies. A bureau of statistics was formed, with a well-known underwriter in charge, and the work of compiling the experience of the various companies was vigorously taken up. Frequent meetings of the Conference were called at which the managers and officers of the various companies discussed the different phases of the business and compared experiences. Policy forms were analyzed and conflicting conditions either eliminated or reconciled. As a result of these meetings, and of the work of the bureau, a manual of rules and rates was promulgated in the summer of 1896 and standard policy forms were adopted shortly afterwards. From time to time thereafter manuals and supplements have been issued by the Conference companies altering rates already established and publishing new rates, these changes and additions resulting from the statistical work carried on by the bureau.

Logical development of liability insurance in America dates from the formation of the liability Conference. Standard rates and policies having been adopted, competition was reduced to practically legitimate methods, and for three years the business went on smoothly and grew rapidly.

This highly satisfactory condition of affairs was rudely disturbed early in the year 1900 by the withdrawal of one of the largest companies from the agreement, and while the Conference continued in existence, its usefulness was considerably impaired. Shortly after this time three foreign companies established American offices and two additional companies were organized in this country, and as none of these newcomers became members of the Conference, the situation grew more critical than before and the companies comprising the Conference came to be the minority, while they had formerly constituted the majority. Early in 1903 one of the smaller companies in the agreement withdrew, being unable to withstand the competition of the outside companies. At

the beginning of 1904, the Conference consisted of five companies, while twelve companies were operating independently.

This great discrepancy in numbers has forced the Conference to become almost solely a bureau of statistics and there is little attempt made to the adherence of standard rates in cases of competition, which are of course the rule rather than the exception. In spite, however, of what might be termed these unsatisfactory conditions, the business has grown and developed astonishingly. From the inconspicuous beginning in 1887 already noted, liability insurance has in the comparatively short space of 17 years taken its place as one of the most important branches of underwriting in this country involving more technical and difficult features than almost any other kind of insurance business.

The liability policies of the present day are substantially the same with all companies, and are known respectively as Employers' Liability, Public Liability, General Liability, Teams Liability, Elevator Liability, Owners' Contingent Liability, Theatre Liability, and Marine Vessel Liability. The premium is based, in most cases, on the estimated annual payroll of employees, and is subject to adjustment at expiration of the policy according as the actual payroll expended is greater or less than the amount estimated. To ascertain this, the assured is required to render a payroll statement to the company which is usually verified by an audit of the assured's books.

Under the various forms of policies issued, protection against legal liability for damages on account of accidental death or injuries to employees and the public is afforded to manufacturers, and contractors, owners, lessees, and tenants of buildings; to owners and users of horses and vehicles, including automobiles, elevators, vessels and boats; to theatres, agricultural exhibitions and shows, and to owners and general contractors of buildings in course of construction. While at first the limits of liability were rarely in excess of \$5,000 for one person injured or killed and \$10,000 for two or more persons injured or killed in any one accident it is now quite common to provide double these limits and in fact the indemnity is often fixed at limits of \$10,000 for one person and \$50,000 for a number of persons injured or killed in one accident. These increased limits are due not only to the inevitable tendency of the courts in the majority of States to sustain verdicts for large amounts, but more particularly to the enactment of laws increasing and extending the liability of employers and others in cases of negligence. For example, in New York State the statutory limit for damages in case of fatal injury from negligence was \$5,000 for an individual until this limit was removed by the legislature a few years ago, leaving the amount recoverable in such cases unlimited. In Illinois, likewise, the sum of \$5,000 was formerly the maximum amount payable, but an act of 1903 increased the individual limit to \$10,000. While it was rare to read 10 years ago of a verdict for \$5,000, such amounts are now deemed quite reasonable in serious or fatal cases, and it is not unusual to find that verdicts of ten, twenty, and even fifty thousand dollars are sustained by the courts of last resort. In fact, legislation is playing a most important part in the evolution of liability insurance in this coun-

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try. The Employers Liability Act of 1887 of Massachusetts, while the most important statute yet to be enacted on this subject, in America, has never been quite satisfactory and just as changes and amendments have been constantly suggested for the English acts of 1880 and 1897, so the legislators of the Bay State have attempted from time to time to extend and alter the provisions of their act. The latest effort in this direction, proposed in 1904, is known as the Workingman's Compensation Act and is quite revolutionary in its character so far as this country is concerned, for nothing of the sort has ever been attempted here before. In the words of an eminent member of Congress from Massachusetts, while discussing this measure, "One of the principal reasons for it is because there have grown up in this country, lawyers and doctors who combine together to hunt up trouble and cheat the injured person out of his money. Another great trouble and reason for the proposed legislation is the employee's habit of bringing suit at once, without trying to bring about amicable relations with the employer. As things are to-day, while employers frequently have to pay out large sums of money, in many cases the injured employee is not benefited. Now, an employee has to show that he received his injuries as the result of the neglect or fault of the employer. This new law does away with all of this and favors the compensation of an employee for the loss of an arm or other serious injury, whether the employer is to blame or not." The passage of the so-called Slater Act of 1902 by New York State was another step in the direction of absolute compensation to workingmen and it is only a question of time and probably a short time, when most of the important States will have legislated on this subject. Not only so, but there is some talk of a national act to be put forward by the United States government affecting these vital questions of the relations between capital and labor.

It may not be entirely utopian to believe that the ameliorating influences of these State laws either with or without a national statute will result ultimately in the more friendly and unselfish attitude between employers and employees and in the discontinuance of strikes and labor disturbances generally.

The growth of liability insurance has kept pace with the industrial development of this country during the past 15 years as will be noted from the following exhibit: From 1889 to 1893 inclusive, premiums amounted to \$9,319,591 and losses to \$3,838,665. From 1894 to 1898 inclusive, premiums were \$20,535,668 and losses \$10,084,319, or an increase of 120 per cent in income and of 162 per cent in claims. From 1899 to 1903 inclusive, premiums were about \$50,000,000 and losses about \$25,000,000 or an increase of 250 per cent in premiums and of 250 per cent in losses over the previous five-year period, and an increase of 437 per cent in premiums and of 552 per cent in losses over the first five-year period.

Steam Boiler Insurance.—The first steam boiler insurance in America was written in 1866, dating almost as early as accident insurance, and like that other branch of indemnity, it owes its origin in this country to the thrifty, practical citizens of Connecticut. It was, however, not until 1869 that the business became well established. At the close of that year total premiums amounted to \$55,819,

and total losses to \$2,188, a modest beginning considering that for the year 1903, premiums aggregated about \$2,000,000, and losses about \$200,000, while the amount of insurance in force had grown from \$5,000,000 to over \$600,000,000.

For many years the pioneer company had a monopoly of the field, as, for some unknown reason, capitalists seemed disposed to leave this business alone, due, perhaps, to the slow growth of the premium income, as well as to the mechanical technicalities of the insurance.

At the outset, the form of contract was limited to indemnity for loss or damage to the boiler or boilers and other property of the assured, and to property of others for which the assured could be held legally liable, due to the explosion, rupture or collapse of the boiler or boilers. As a guarantee of the value of this indemnity, as well as a protection to the company against the insurance of old and unsafe boilers, a periodical inspection is made of each boiler during the term of the policy by an inspector of the company, and a written report is forwarded to the policy holder showing the condition of the boiler, recommending such repairs or changes as appear necessary, and stipulating the pressure under which the boiler can safely be run. Steam users were at first slow to grasp the many advantages offered by this new scheme, and engineers of plants strongly resented the reflection on their skill and management implied by some of the features of the insurance. Conflicts of opinion between the inspector of the company and the engineer of the assured were of frequent occurrence and oftentimes much hard feeling was engendered. Nothing daunted by these obstacles, the company vigorously pushed forward the business and at the end of the first 20 years the premium income had grown to about \$1,000,000.

In the year 1887 another company was organized which gave considerable impetus to the business and introduced a new feature, namely, indemnity against loss from legal liability for fatal or non-fatal injuries suffered by any person or persons due to the explosion, rupture, or collapse of the boiler or boilers. From this time forward the business increased rapidly.

On 1 Jan. 1904 nine companies were engaged in the business of the insurance of boilers, tanks, dryers, rotaries, digesters, and other objects operated under steam pressure. Nearly 150,000 boilers were regularly inspected in 1903 and a small army of inspectors are maintained by the various companies at an annual expenditure of several hundred thousand dollars. Policies are frequently issued for as much as \$100,000 limit for any one loss, and a limit of \$50,000 is quite common. Notwithstanding the great number of objects insured annually, and the large limits of liability as above mentioned, serious explosions have been comparatively rare, and the average loss ratio of the largest company for 35 years has not exceeded 10 per cent per year. This showing would seem to indicate that there is an exceptionally large profit to be made in this branch of casualty insurance, but such is not the case, for owing to the inspection system before mentioned, the management expenses range from 60 to 85 per cent of the premium income. Some of the companies maintain in connection with

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the inspection department, a force of draughtsmen for the purpose of furnishing plans and specifications for new boilers, at the request of their policy holders or of prospective clients. This service is rendered without charge and adds somewhat to the already heavy expense of conducting the business. It is interesting to learn from the statistics of one of the companies, that from the beginning of their business to 1 Jan. 1903 the number of visits of inspection made was 1,815,465. The total number of boilers inspected was 3,568,838. The total number of defects discovered was 2,559,592, of which dangerous defects numbered 270,856, and 15,169 boilers were condemned as unfit for use. During the year 1902 the company made 142,000 visits of inspection, examined 264,708 boilers, condemned 1,004 boilers, found 145,489 defects, of which 13,000 were dangerous.

The total premiums of all companies during 35 years, to the close of 1903, amounted to nearly \$25,000,000, and total losses to almost \$2,500,000, and with the rapid increase in the number of new manufacturing plants throughout the country, and the general expansion of business, it is safe to predict that steam boiler insurance will develop much more rapidly in the next decade than in the past quarter century.

Plate Glass Insurance.—The first American plate glass insurance company was organized in New Jersey in 1868, but unlike the pioneers in the other casualty lines, this company does not rank among the leading companies in point of financial strength or amount of business written. In 1874, the first New York company was started, and from that year the business steadily increased in volume, total premiums for 1903 amounting to over \$2,000,000, and total losses to over \$800,000. There have been fewer changes in the plate glass policy than in any other of the casualty contracts, presumably because the business is less intricate and there has been no occasion to make many changes. Plate glass insurance provides indemnity on account of loss or damage caused by breakage of glass, provided that such breakage is the result of accident and due to causes beyond the control of the assured. No claim is paid, however, for breakage resulting directly or indirectly from fire, earthquake, inundation, insurrection, riot, or any military or usurped power, or from the blowing up of buildings or from alterations or repairs to the premises. While for years the insurance was limited almost entirely to what is known as plain plate glass, many different kinds of glass, such as bevelled, mitred, cathedral, leaded, chipped, bent, Florentine, jewelled, ribbed and wired glass are now insured freely by all companies.

In 1900 plate glass underwriters were confronted with an entirely new proposition in the shape of clamped or patented plate glass, resulting from riveting the sides and tops of plate glass together without the use of wooden frames that before that time had been indispensable. The rates formulated for patented glass were at first entirely inadequate and the companies lost a considerable sum while experimenting with the subject. Not only was there great trouble and delay in having broken glass replaced, but the patentees, having a monopoly, were disposed to secure the full benefit from the product of their ingenuity. As a result of these conditions, the companies placed an almost prohibitive rate on

all patented glass in the hope that they could successfully taboo that kind of risk, but the public demand for it was too great and patented glass has come more and more into general use. However, near the close of the year 1903, the leading companies found that the experience with patented glass had been more favorable than had been anticipated, and, as a result, the rate was materially reduced.

Plate glass insurance is now almost as general as fire insurance, and while the average premium is small, the business has assumed very considerable proportions. During 30 years ending 31 Dec. 1903 total premiums amounted to over \$20,000,000, and total losses to over \$8,000,000. Fifteen stock companies were on that date engaged in the business, in addition to numerous local mutual companies located in various parts of the country. From time to time in the past 10 years, compacts have been formed between the largest companies for the purpose of regulating rates, and establishing sound underwriting practices. Unfortunately, however, these agreements have been of comparatively short duration and as oftentimes happens in similar cases, the demoralization following the termination of the compact has been even greater than before it was made.

It is difficult to predict what will be the final outcome of the admittedly unsatisfactory state of affairs prevailing in plate glass insurance, with rates low, commissions excessively high (sometimes as much as 50 per cent), and the cost of replacements increasing, unless the companies form a national compact and place the business upon a logical underwriting basis. One company heretofore writing plate glass insurance alone, decided early in the year 1904 to add a personal accident department, and it is probably only a question of time when every company engaged in this one line of business will be forced either to add other lines of insurance, or to consolidate with other companies engaged in the same business.

Sprinkler Leakage Insurance.—While not constituting one of the main divisions of casualty insurance, this form of policy is written to a limited extent by two of the casualty companies, as well as by some fire insurance companies. The contract covers loss or damage to the building and contents caused by the accidental discharge or leakage (except from fire) of the sprinkler equipment erected in or on the premises. The premium, based at a varying rate, depending on the class of merchandise covered, is predicated upon a certain percentage, usually 10 per cent, of the cash value of the building, stock, and machinery. Sprinkler leakage insurance has been in vogue only nine years in America, during which period the total premiums have not amounted to any considerable sum. There is, however, a slow, steady growth of the business, due to the wider use of sprinklers in mercantile and manufacturing plants, principally in the Eastern and Middle States.

Fly-wheel Insurance.—This is one of the less important branches of casualty insurance and is of recent origin in this country. One company alone is engaged in the business at this time, and hence the statistics are limited. The contract covers loss caused by the explosion, bursting, or disruption, during rotation of the fly-wheels or any of them, first for loss upon the fly-wheel or fly-wheels and upon other property

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try. The Employers Liability Act of 1887 of Massachusetts, while the most important statute yet to be enacted on this subject, in America, has never been quite satisfactory and just as changes and amendments have been constantly suggested for the English acts of 1880 and 1897, so the legislators of the Bay State have attempted from time to time to extend and alter the provisions of their act. The latest effort in this direction, proposed in 1904, is known as the Workingman's Compensation Act and is quite revolutionary in its character so far as this country is concerned, for nothing of the sort has ever been attempted here before. In the words of an eminent member of Congress from Massachusetts, while discussing this measure, "One of the principal reasons for it is because there have grown up in this country, lawyers and doctors who combine together to hunt up trouble and cheat the injured person out of his money. Another great trouble and reason for the proposed legislation is the employee's habit of bringing suit at once, without trying to bring about amicable relations with the employer. As things are to-day, while employers frequently have to pay out large sums of money, in many cases the injured employee is not benefited. Now, an employee has to show that he received his injuries as the result of the neglect or fault of the employer. This new law does away with all of this and favors the compensation of an employee for the loss of an arm or other serious injury, whether the employer is to blame or not." The passage of the so-called Slater Act of 1902 by New York State was another step in the direction of absolute compensation to workingmen and it is only a question of time and probably a short time, when most of the important States will have legislated on this subject. Not only so, but there is some talk of a national act to be put forward by the United States government affecting these vital questions of the relations between capital and labor.

It may not be entirely utopian to believe that the ameliorating influences of these State laws either with or without a national statute will result ultimately in the more friendly and unselfish attitude between employers and employees and in the discontinuance of strikes and labor disturbances generally.

The growth of liability insurance has kept pace with the industrial development of this country during the past 15 years as will be noted from the following exhibit: From 1889 to 1893 inclusive, premiums amounted to \$9,319,591 and losses to \$3,838,665. From 1894 to 1898 inclusive, premiums were \$20,535,668 and losses \$10,084,319, or an increase of 120 per cent in income and of 162 per cent in claims. From 1899 to 1903 inclusive, premiums were about \$50,000,000 and losses about \$25,000,000 or an increase of 250 per cent in premiums and of 250 per cent in losses over the previous five-year period, and an increase of 437 per cent in premiums and of 552 per cent in losses over the first five-year period.

Steam Boiler Insurance.—The first steam boiler insurance in America was written in 1866, dating almost as early as accident insurance, and like that other branch of indemnity, it owes its origin in this country to the thrifty, practical citizens of Connecticut. It was, however, not until 1869 that the business became well established. At the close of that year total premiums amounted to \$55,819,

and total losses to \$2,188, a modest beginning considering that for the year 1903, premiums aggregated about \$2,000,000, and losses about \$200,000, while the amount of insurance in force had grown from \$5,000,000 to over \$600,000,000.

For many years the pioneer company had a monopoly of the field, as, for some unknown reason, capitalists seemed disposed to leave this business alone, due, perhaps, to the slow growth of the premium income, as well as to the mechanical technicalities of the insurance.

At the outset, the form of contract was limited to indemnity for loss or damage to the boiler or boilers and other property of the assured, and to property of others for which the assured could be held legally liable, due to the explosion, rupture or collapse of the boiler or boilers. As a guarantee of the value of this indemnity, as well as a protection to the company against the insurance of old and unsafe boilers, a periodical inspection is made of each boiler during the term of the policy by an inspector of the company, and a written report is forwarded to the policy holder showing the condition of the boiler, recommending such repairs or changes as appear necessary, and stipulating the pressure under which the boiler can safely be run. Steam users were at first slow to grasp the many advantages offered by this new scheme, and engineers of plants strongly resented the reflection on their skill and management implied by some of the features of the insurance. Conflicts of opinion between the inspector of the company and the engineer of the assured were of frequent occurrence and oftentimes much hard feeling was engendered. Nothing daunted by these obstacles, the company vigorously pushed forward the business and at the end of the first 20 years the premium income had grown to about \$1,000,-000.

In the year 1887 another company was organized which gave considerable impetus to the business and introduced a new feature, namely, indemnity against loss from legal liability for fatal or non-fatal injuries suffered by any person or persons due to the explosion, rupture, or collapse of the boiler or boilers. From this time forward the business increased rapidly.

On 1 Jan. 1904 nine companies were engaged in the business of the insurance of boilers, tanks, dryers, rotaries, digesters, and other objects operated under steam pressure. Nearly 150,000 boilers were regularly inspected in 1903 and a small army of inspectors are maintained by the various companies at an annual expenditure of several hundred thousand dollars. Policies are frequently issued for as much as \$100,000 limit for any one loss, and a limit of \$50,000 is quite common. Notwithstanding the great number of objects insured annually, and the large limits of liability as above mentioned, serious explosions have been comparatively rare, and the average loss ratio of the largest company for 35 years has not exceeded 10 per cent per year. This showing would seem to indicate that there is an exceptionally large profit to be made in this branch of casualty insurance, but such is not the case, for owing to the inspection system before mentioned, the management expenses range from 60 to 85 per cent of the premium income. Some of the companies maintain in connection with

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the inspection department, a force of draughtsmen for the purpose of furnishing plans and specifications for new boilers, at the request of their policy holders or of prospective clients. This service is rendered without charge and adds somewhat to the already heavy expense of conducting the business. It is interesting to learn from the statistics of one of the companies, that from the beginning of their business to 1 Jan. 1903 the number of visits of inspection made was 1,815,465. The total number of boilers inspected was 3,568,838. The total number of defects discovered was 2,559,592, of which dangerous defects numbered 270,856, and 15,169 boilers were condemned as unfit for use. During the year 1902 the company made 1,42,000 visits of inspection, examined 264,708 boilers, condemned 1,004 boilers, found 145,489 defects, of which 13,000 were dangerous.

The total premiums of all companies during 35 years, to the close of 1903, amounted to nearly \$25,000,000, and total losses to almost \$2,500,000, and with the rapid increase in the number of new manufacturing plants throughout the country, and the general expansion of business, it is safe to predict that steam boiler insurance will develop much more rapidly in the next decade than in the past quarter century.

Plate Glass Insurance.—The first American plate glass insurance company was organized in New Jersey in 1868, but unlike the pioneers in the other casualty lines, this company does not rank among the leading companies in point of financial strength or amount of business written. In 1874, the first New York company was started, and from that year the business steadily increased in volume, total premiums for 1903 amounting to over \$2,000,000, and total losses to over \$800,000. There have been fewer changes in the plate glass policy than in any other of the casualty contracts, presumably because the business is less intricate and there has been no occasion to make many changes. Plate glass insurance provides indemnity on account of loss or damage caused by breakage of glass, provided that such breakage is the result of accident and due to causes beyond the control of the assured. No claim is paid, however, for breakage resulting directly or indirectly from fire, earthquake, inundation, insurrection, riot, or any military or usurped power, or from the blowing up of buildings or from alterations or repairs to the premises. While for years the insurance was limited almost entirely to what is known as plain plate glass, many different kinds of glass, such as bevelled, mitred, cathedral, leaded, chipped, bent, Florentine, jewelled, ribbed and wired glass are now insured freely by all companies.

In 1900 plate glass underwriters were confronted with an entirely new proposition in the shape of clamped or patented plate glass, resulting from riveting the sides and tops of plate glass together without the use of wooden frames that before that time had been indispensable. The rates formulated for patented glass were at first entirely inadequate and the companies lost a considerable sum while experimenting with the subject. Not only was there great trouble and delay in having broken glass replaced, but the patentees, having a monopoly, were disposed to secure the full benefit from the product of their ingenuity. As a result of these conditions, the companies placed an almost prohibitive rate on

all patented glass in the hope that they could successfully taboo that kind of risk, but the public demand for it was too great and patented glass has come more and more into general use. However, near the close of the year 1903, the leading companies found that the experience with patented glass had been more favorable than had been anticipated, and, as a result, the rate was materially reduced.

Plate glass insurance is now almost as general as fire insurance, and while the average premium is small, the business has assumed very considerable proportions. During 30 years ending 31 Dec. 1903 total premiums amounted to over \$20,000,000, and total losses to over \$8,000,000. Fifteen stock companies were on that date engaged in the business, in addition to numerous local mutual companies located in various parts of the country. From time to time in the past 10 years, compacts have been formed between the largest companies for the purpose of regulating rates, and establishing sound underwriting practices. Unfortunately, however, these agreements have been of comparatively short duration and as oftentimes happens in similar cases, the demoralization following the termination of the compact has been even greater than before it was made.

It is difficult to predict what will be the final outcome of the admittedly unsatisfactory state of affairs prevailing in plate glass insurance, with rates low, commissions excessively high (sometimes as much as 50 per cent), and the cost of replacements increasing, unless the companies form a national compact and place the business upon a logical underwriting basis. One company heretofore writing plate glass insurance alone, decided early in the year 1904 to add a personal accident department, and it is probably only a question of time when every company engaged in this one line of business will be forced either to add other lines of insurance, or to consolidate with other companies engaged in the same business.

Sprinkler Leakage Insurance.—While not constituting one of the main divisions of casualty insurance, this form of policy is written to a limited extent by two of the casualty companies, as well as by some fire insurance companies. The contract covers loss or damage to the building and contents caused by the accidental discharge or leakage (except from fire) of the sprinkler equipment erected in or on the premises. The premium, based at a varying rate, depending on the class of merchandise covered, is predicated upon a certain percentage, usually 10 per cent, of the cash value of the building, stock, and machinery. Sprinkler leakage insurance has been in vogue only nine years in America, during which period the total premiums have not amounted to any considerable sum. There is, however, a slow, steady growth of the business, due to the wider use of sprinklers in mercantile and manufacturing plants, principally in the Eastern and Middle States.

Fly-wheel Insurance.—This is one of the less important branches of casualty insurance and is of recent origin in this country. One company alone is engaged in the business at this time, and hence the statistics are limited. The contract covers loss caused by the explosion, bursting, or disruption, during rotation of the fly-wheels or any of them, first for loss upon the fly-wheel or fly-wheels and upon other property

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of the assured; second, for loss from liability of the assured for loss upon property of any other person or persons; third, for loss from liability of the assured for bodily injuries or death sustained by any person or persons. Fly-wheel insurance is more or less allied to boiler insurance, and the limits of the company's liability in case of loss, as well as the rates of premium and the methods of handling the business, are very much the same as in boiler insurance. The insurance against breakage of machinery in general is being introduced to some extent in one or two European countries, but has not yet been attempted in America. There appears to be a field for such a policy, and doubtless the indemnity will be offered by some American company before very long. In fact, at the present time, a few corporations are engaged in the business of insuring the maintenance of electric machinery and of making the repairs found necessary from a periodical inspection of the premises or plants.

Physicians' Liability Insurance.—This is another of the modern schemes in casualty insurance, and provides indemnity against loss from common law or statutory liability for damages on account of bodily injuries fatal or non-fatal suffered by any person or persons in consequence of any alleged error, mistake, or malpractice by the assured in the practice of his profession. The limits of the company's liability are uniformly \$5,000 for one person injured or killed, and \$10,000 for any number of persons injured or killed during the term of the policy. Naturally, the moral hazard is the main consideration in a contract of this nature, and, while a fixed premium is charged, a careful selection is made by the conservative companies of the risks offered.

Taken all in all, the field for casualty insurance is an ever widening one, and the vast interests involved have given to this branch of indemnity a place in the front rank of insurance schemes. The magnitude of the business, the great scope of the contracts, the elaborate and comprehensive machinery required to properly conduct the affairs of these great corporations, can best be understood and appreciated when it is known that during the period in which the various lines of casualty insurance heretofore enumerated have been written by the total premiums have exceeded \$221,000,000, the total losses have been more than \$88,000,000, and the total amount of insurance in force on 1 Jan. 1904 was estimated at the bewildering sum of over \$5,000,000,000.

EDWIN W. DE LEON,
*Vice-President Casualty Company of America,
New York*

Insurance, Credit, is a business proposition which offers to the seller of merchandise on credit protection against excessive losses as the result of bad debts. When loss occurs a certain percentage is to be borne by the party insured, and the balance of the loss is made good by the company issuing the policy of indemnity. To illustrate: Application is made for an insurance bond on sales amounting to \$400,000 a year, and a bond is written on a basis of one half of 1 per cent loss; this one half of 1 per cent on sales, or \$2,000, would represent the insured's own risk in bad debts, and if he lost no more than that amount he would receive nothing from his in-

surance. But should his losses be \$5,000 in bad debts, his own loss would still be only \$2,000, and the excess, or \$3,000, would be paid him by the insurer, provided the losses had come within the terms and conditions of the bond. Credit insurance is a natural product of the present age. The first important systematic aid to the credit system was the establishment of the commercial agency, which is now recognized as indispensable to an intelligent transaction of credit business. But this first aid was not complete within itself, and a supplementary system was needed to still further minimize the risk of excessive losses through insolvency of debtors, which want is supplied by credit insurance.

The annual losses in the United States by the insolvency of debtors exceed by about 50 per cent the losses by fire. It has long been the general custom to pay insurance companies to carry the risk of loss by fire, but until comparatively recent years each merchant had to carry his own risk of loss through insolvency of debtors. Credit insurance is based on the sound economic principle which recognizes the province of the specialist. Both fire and life insurance offer protection superior to that which can be obtained through any other medium, because the principle of the law of average cannot be efficiently employed except by the specialist. Protection is against the possibility of abnormal loss no less with fire than with credit insurance. Credit insurance from the standpoint of the insurer proceeds on the principle of average which promises a profitable return on the sale of protection. The cost of protection is assessed on the basis of normal losses accruing in any given business for a period of years. Such loss may be termed the normal loss. Normal loss is that inevitable impairment of resource which can be borne by a business and yet admit of a satisfactory dividend on capital invested. Abnormal loss is loss in excess of that which permits satisfactory dividend on capital investment, and it is against such loss that credit insurance offers protection. From the standpoint of the insured, credit protection cannot be considered a profit-earning investment. It is simply and solely protection against excessive loss by bad debts. A crop failure; an epidemic of disease, or a widespread or protracted industrial labor strike, are possibilities of danger which no man can provide against, as respects commercial credits, except through the medium of insurance protection. Experience may qualify a credit man to guard against bad debts through the rascality or impaired credit condition of those seeking credit, but no amount of experience or capacity can of themselves render it possible to provide against contingencies growing out of such cases as above mentioned.

Great care should be exercised by the insured in taking out a policy of credit indemnity. The peculiar need of his business should be intelligently considered. Precedent cannot be safely followed, for the character of every man's business is in more or less degree individual. Unless an intelligent application of the principle of credit insurance is made to each individual case, the greatest amount of protection cannot be realized. The principle of credit insurance being economically sound, it follows that if the insured in any given case does not realize the protection contemplated, it is because the conditions of the

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indemnity are not adjusted to the needs of the business. No amount of indemnity can be considered a profit maker of itself; its true sphere is that of a profit saver. In explanation of the proposition that an insured is always a loser, when his losses make demand on the indemnity company, it is conceivable that excess losses should so dovetail with the conditions of the policy as to reimburse the insured for every dollar of excess loss, but such instances would be rare indeed.

It would be practically impossible to limit precisely the line of credit on every individual case to the exact ratio of protection. Such a conservative policy would by no means realize the best results of credit protection, and, if strictly adhered to, would restrict rather than expand business. Protection can be made to operate injuriously in both directions, and it would be as false policy to limit business to the letter of protection as it would be to expand it beyond the limits of the spirit of indemnity. A credit should not be extended merely by reason of the collateral security furnished by credit-indemnity, but such security should be used to justify a risk which would not otherwise be undertaken, and to increase a line of credit beyond its natural unsecured limit. A bank will not lend on collateral alone. The personnel of an individual borrower is an equation which can not be eliminated, whether the loan be in money by a bank or in merchandise by a merchant. Collateral security in the case of a bank operates to reduce the interest rate, and the difference between the rate which would be demanded without collateral and the rate with collateral, measures the premium paid by the bank for the protection. In the case of a merchant, the rate paid for protection is the cost of carrying the security as represented by the premium on the policy of indemnity. The banker, therefore, pays a higher rate for collateral protection than the merchant.

The essential features of the contract between the insured and the insurer are: (1) The insured to bear a normal loss of an agreed percentage of his annual sales. The said ratio of own loss to be determined by facts established by the record of the business for a series of years. (2) Insurance to apply to both rated and unrated accounts at an agreed ratio, as the circumstances of the business in question may require and justify. (3) Liberal insolvency conditions, in which technical distinctions are eliminated, and the actual and virtual facts equitably arrived at. (4) Prompt payment of losses at the period of settlement.

J. A. TAYLOR,
Prest. Wilmington, N. C., Board of Trade.

Insurance Engineering, a science or method of procedure for the better application of principles and rules in the business of insuring property against fire. The decision of the trustees of the Massachusetts Institute of Technology to establish a course in what for want of a better name has been designated insurance engineering, is commendable and should meet with hearty encouragement from the fire underwriters. Its object will be to instruct those who take the course in the selection and constructive use of materials with a view to minimize the risk of destruction by fire. Naturally, this will for the present relate more directly to mill and factory property than to dwellings, but the influence of such a school should soon be

felt in every department of architecture, especially if out of its work shall grow a determination on the part of the fire underwriters to make such discrimination against buildings in which they are expected to take all the risks as will make it to the advantage of those who build or buy houses of any kind to do what is possible to share this risk by guarding against fire within practicable limits of slow-burning construction.

The latest official calculations — those of Insurance Commissioner Dearth of Minnesota — lead to the conclusion that 75 per cent of the enormous annual loss from fires in this country results from fires which are preventable. The policy of the insurance companies has lent itself to the encouragement of indifference on the part of owners of insured property to everything except the rate of premium. Commissioner Dearth's further conclusions are:

It is not to the large number of promiscuous fires that heavy losses to property are attributable, but more to the larger select risks occurring in heavy commercial circles where great values are involved. One of the greatest evils in fire underwriting is in the matter of over-insurance, which places a premium upon criminal carelessness on the part of the assured, if not absolute incendiарism. For this evil the companies themselves alone are, of course, to blame, and consequently have it entirely within their power to eliminate. There is very little question that the companies are at the present time exercising a far greater degree of precaution in this direction than heretofore; in short, cancellations, reducing the liability of the companies on all the more hazardous classes of risks, are causing not only the local agents, but the assured, no end of trouble, and much greater care is, beyond question, being exercised in the line of inspections, especially looking to the matter of values as compared with the amount of insurance covering on the property. These are all matters that are being strenuously considered by the underwriters throughout the country, and beyond question must result in a material decrease in the fire waste.

The erection of insurance engineering into a profession will enable the insurance companies gradually to reorganize their business on safer lines, and in so doing discourage the practices which have grown up through the co-operation of owners and agents to saddle them with larger responsibilities than any scale of practicable premiums would warrant. The number of men qualified to practise as insurance engineers has never been great enough to meet the requirements of the companies. The new school should have an immediate and important practical relation to the public welfare in the safeguarding of life and property and the raising of the standards of construction in buildings admitting of classification as insurable risks.

The undertaking has the enthusiastic support and co-operation of Edward Atkinson of Boston, whose efforts in recent years have materially changed the methods of mill construction and the theories of industrial insurance; and it has appealed so strongly to mill owners, builders, manufacturers, and other investors to whom fire is a constant menace that, at Mr. Atkinson's instance, a fund sufficient to place it at once on a substantial money basis with liberal allowance for the heavy initial expense has been raised

Insurance, Fraternal. The principles which govern the system of fraternal insurance can be gleaned only from the decisions of the courts of law, the dictum of the insurance departments of the different States, the files of the leading fraternal journals, and the official reports issued by the National Fraternal Congress, the associated fraternities of America and the fraternal societies themselves.

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Fraternal Insurance, as popularly understood at the present time, is "The obligation of a fraternal beneficiary association to pay the benefits prescribed in its constitution and laws when all requirements by or on behalf of the members are fulfilled." In the early days of fraternalism in America the term "protection" was universally used in describing the benefits furnished by the different beneficiary societies. See FRATERNAL BENEFICIARY SOCIETIES IN AMERICA.

The term fraternal insurance, although originally a misnomer, and clearly inapplicable in any true conception of the real aims and objects of a fraternal beneficiary association, has, however, come into general use of late years as being synonymous with the words fraternal protection and fraternal benefits, whenever reference is made to the money benefits paid by a fraternal beneficiary society. This change has come about so gradually that it is difficult to trace its origin or fully measure its effects. The primary cause of this mingling of insurance terms with fraternal names has undoubtedly been the failure of the officials of the different societies to constantly keep in mind the distinction between the insurance contract supplied by an insurance company and the fraternal protection furnished by a fraternal society, while a secondary cause has been the efforts of the insurance commissioners of the different States to compel all fraternal beneficiary associations to comply with the regulations in force as to insurance companies.

In order, therefore, to fully understand the scope and meaning of the term fraternal insurance, as now understood, it is first necessary to ascertain the meaning of the word insurance. Webster defines it as "a contract whereby for a stipulated consideration called premium one party undertakes to indemnify or guarantee another against loss by certain specified risks." The supreme court of Pennsylvania (1890), in the case of the Commonwealth *v.* the Equitable Beneficial Association (137 Pa. St. 412) (18 Atl. 1,112), thus points out the distinction between regular life insurance and fraternal protection, as then understood.

"The general object or purpose of an insurance company is to afford indemnity or security against loss. Its engagement is not founded in any philanthropic, benevolent, or charitable principle; it is a purely business venture, in which one, for a stipulated consideration or premium per cent engages to make up, wholly or in part, or in a certain agreed amount, any specific loss which another may sustain, and it may apply to loss of property, to personal injury, or to loss of life. To grant indemnity or security against loss, for a consideration, is not only the design and purpose of an insurance company, but is also the dominant and characteristic feature of the contract of insurance.

"What is known as a beneficial association, however, has a wholly different object and purpose in view. The great underlying purpose of the association is not to indemnify or secure against loss; its design is to accumulate a fund from the contributions of members for beneficial or protective purposes, to be used in their own aid or relief in the misfortunes of sickness, injury or death. The benefits, although secured by contract, and for that reason, to a limited extent, assimilated to the proceeds of insurance,

are not so considered. Such societies are rather of the philanthropic or benevolent character. Their beneficial features may be of a narrow or restrictive character; the motives of the members may be to some extent selfish, but the principle upon which they rest is founded in the considerations mentioned. These benefits, by the rules of the organization, are payable to their own unfortunate out of funds which the members themselves have contributed for the purpose, not as an indemnity or security against loss, but as a protective relief in cases of sickness or injury, or to provide the means of a decent burial in the event of death. Such societies have no capital stock; they yield no profit, and their contracts, although beneficial and protective, altogether exclude the idea of insurance, or of indemnity, or of security against loss."

We may therefore assume that insurance is a contract between an insurance company on the one hand and the insured on the other, and provides for the payment of a specific indemnity by the company in consideration of certain stipulated premium payments by or on behalf of the insured. It has been held that a verbal contract of insurance is valid, but by universal practice the contract is made in writing, and is called a policy. The policy, therefore, expresses the terms of the contract, and governs the right of the parties.

Fraternal insurance, on the other hand, is the very antithesis of insurance as above understood. A fraternal society does not, and under the laws of the different States has no power to, make an insurance contract. It does not, and cannot, issue a policy. It does not promise indemnity against loss, and is not limited to any stipulated premium payments. Its contract is not between the society on the one hand and the members on the other, but between the members of the society, each with the others, and this contract is not expressed in the certificate of membership issued by the society. This certificate which it issues is not a policy. If it were, the society would immediately cease to be a fraternal society, and be not only classed by the insurance departments of the different States as an insurance company, but required to report and pay taxes as such. The usual form of certificate in use certifies that the holder has been duly and regularly accepted and admitted to membership in the organization, and entitled to all the rights and privileges accruing under the specified benefit, as prescribed in its constitution and laws as then existing or subsequently altered or amended by the duly constituted supreme body of the association. The certificate, therefore, is merely evidence of membership, and certifies that the holder is entitled to the rights and privileges flowing therefrom. It is in no sense a policy, and has never been so construed by any court of last resort.

If late years there has been some conflict in the decisions of the courts as to the legal effect of some peculiar certificates of membership that have been issued by fraternal associations, but in the leading cases the courts have uniformly adhered to the rule that the certificate is merely evidence of membership, and that the rights of the parties, or, in other words, the contract for fraternal protection, is governed by the constitution and laws of the organization as they exist at the time the right to the benefit accrued, although in some cases the society has been held

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to have waived certain provisions in its constitution and laws because of peculiar features in its certificate, and in other cases, certain practices or customs that, in the judgment of the court, tended to mislead the members, as to the proper construction or binding effect of some clauses in the constitution, have been held to be a waiver on those provisions.

The laws of the different States require every fraternal beneficiary association to have a representative form of government and to be organized and carried on for the sole benefit of its members and their beneficiaries. Each member, therefore, has a voice in the management, and has no right to complain of any lawful changes, alterations or amendments to the constitution and laws made during his membership, because they have been made by him or in his behalf, and for the general good of the entire membership.

As the organization is purely mutual, every member who is to share in the benefits ought in equity to bear his fair share of the cost, and it follows, therefore, that he is also bound by any changes that may be made in his rate of dues or assessments by the constituted authorities of the organization.

To sum up in a word, "insurance" is a contract, while fraternal protection is the result of a contract; the one makes a definite promise of a certain indemnity in consideration of certain stipulated premium payments, while the other is the obligation of a fraternal association to pay the benefits prescribed in its constitution and laws when all requirements by or on behalf of a member have been fulfilled. Many, of course, prefer to rely on the business promise of the insurance company to pay the prescribed indemnity, but the millions of members in the fraternal societies of America prefer their fraternal protection, not only because it is cheaper, but because it is better and surer. Every member of every fraternal association fully realizes that any tampering with good faith in dealing with any single member would be fatal to the organization, and ultimately injure the entire membership. In the judgment of all true fraternalists, the mutual interests of the members, therefore, constitute a safeguard that is far more reliable, and certainly more durable, than the mere promise of any purely business company. The membership of the various fraternal beneficiary associations in America that report to the insurance departments of the different States is over 4,500,000, and the amount of protection carried is in excess of \$6,450,000,000. Up to the end of 1902, the various societies have distributed over \$800,000,000 among the beneficiaries of deceased members. Last year their total payments for death losses were over \$73,000,000. These figures do not include the vast number of small societies scattered through the various States which do not report to the insurance departments. For further information consult: The Annual Reports of the Insurance Departments of the different States, and the Official Reports of the Fraternal Beneficiary Societies.

FREDERICK GASTON,
President *The Grand Fraternity.*

Insurance, Life, In America. The ordinary mind fails to grasp the significance of the enormous figures representing the business of American life assurance companies at the present day. The accumulated funds of the companies

reporting to the State of New York in 1902 were over \$2,000,000,000, and the assurance in force in these same companies was over \$8,400,000,000. The existing American companies have during the past 50 years paid out, in the shape of matured policies, dividends of profits, surrender values, etc., more than \$3,000,000,000. If what is known as "industrial" business were added to the above figures, the assurance in force would be larger by over \$1,700,000,000, and assessment and fraternal assurance would add nearly \$6,500,000,000 more.

It may assist the imagination in realizing the immensity of these sums to compare the accumulations of the standard American life assurance companies with some other large masses of investments. For example, the national debt of the United States is \$1,314,929,600, or about two thirds the amount of the accumulated funds of the American life assurance companies reporting to the State of New York. The capital of the Bank of England is £14,553,000, which at \$4.86618 would be \$70,800,000, or about one fifth of the accumulated assets of any one of the three largest life assurance companies of America, and less than one twenty-fifth of the accumulated funds of all the American companies reporting to the State of New York. The combined capital of all the national and State banks in New York city is about \$199,224,700.

In support of the statement that the great sums of money and obligations accumulated by the American life assurance companies have been chiefly rolled up within 50 years, it may be stated that the entire assets of the 15 life assurance companies existing in the United States in 1852 amounted to little over \$7,900,000, and the amount assured by policies then existing hardly exceeded \$80,000,000.

The returns of these companies, as collated in the first annual report of the Insurance Commissioner of Massachusetts, made in 1855, indicate that the business of life assurance at that time was in an exceedingly crude state, both as to volume and method, and it would astonish many an agent engaged in soliciting business for companies in modern times, on the basis of large dividends of profits, to see how little in that day was made of this feature of the assurance contract, the attention of the officers being concentrated upon the elements of permanency and certainty of payment. One company says in its official report: "We disapprove of dividends, except conditional dividends, and hope to see the system abandoned." Another company answers: "Dividends annually, if the condition of the company is such as to admit of the same safely, and then declared in scrip." Another says: "Dividends paid at the discretion of directors." These admissions by the American companies in their infant stage are almost comical when compared with the modern returns, showing, for example, that during the year 1902, \$26,589,715.25 in dividends were paid to policy-holders by the companies reporting to the State of New York, and besides, \$310,917,220.77 of surplus were held for apportionment and distribution at times when future dividends fall due under the contracts.

If the tremendous results of the American companies were due to a natural and spontaneous evolution, we should expect to find a similar condition of things in other countries than the United States, but this is not the case. Life assurance was, indeed, a gradual development in

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the older countries. It would be difficult to state accurately how early the principle of mutual assurance was put into some kind of practice. Ordinances are discovered in France and other continental countries as early as the 16th century prohibiting any assurance on the life of men, showing that the practice must have obtained before that time, and was then frowned upon. Modern assurance in any organized form seems to have been first adopted probably as early as the 15th century. The first English statute on this subject was passed in 1601, and recites that "it hath bene tyme out of mynde an usage amongst merchants, bothe of this realme and of forraine nacyons, when they make any greate adventure, to give some consideracion of money to other persons to have from them assurance made of their goodes." Organized fire insurance seems to have dated from the latter part of the 17th century. Annuities and tontines were also known after the middle of the 17th century, and it was in the latter part of this century that Halley, the Astronomer Royal of that day, published what is known as 'The Breslau Table of Mortality.' This was one of the earliest steps taken toward the recognition of life assurance as a science, and the study and development of the science in a practical way are indicated by the successive mortality tables, each improving on its predecessor.

The first organized life assurance institution in England was the Amicable Society, founded in 1706, but the real history of British life assurance begins with the organization of the Equitable Life Assurance Society in 1762, and Dr. Price, who repeatedly did work for that company, constructed the 'Northampton Mortality Tables' in 1780, which was long regarded as a true guide to the expectation and duration of life, and is still used by the supreme court of the State of New York as a basis for estimating the value of certain life estates. The 'Carlisle Table of Mortality' was published by Mr. Joshua Milne in 1816, from observations upon the mortality of two parishes in the city of Carlisle. The table is still in use, even among some American companies, for annuities, but has been generally supplanted by later and more appropriate tables deduced from the experience of many life assurance companies, the principal tables being the 'Actuaries,' or 'Seventeen Offices Experience,' 'The Institute of Actuaries Experience' (1863), 'The American Experience' and the new experience just published by the Institute of Actuaries, which now form the guides for American assurance organizations.

The history of life assurance in Great Britain, from the latter part of the 17th century to the present time, has been one of gradual growth. In 1867, a list was published of over 350 life assurance companies that had been organized in Great Britain. Many of these were "bubble" concerns, as may be inferred from the fact that to-day there are less than 100 British companies doing business in ordinary life assurance. The total ordinary business in force in these companies is a little over £660,000,000, or, at \$4,866,18, about \$3,211,678,800 and the accumulated funds of these companies is only a little over £296,000,000, or, at \$4,866,18, about \$1,440,389,280. Thus it appears that in what may be called the birthplace of life insurance, the accumulated funds of 125 years are about \$500,000,000 less than the American companies have

accumulated in 50 years, and the outstanding assurance of the former is less than two fifths of that of the latter.

If we pursue our investigations into Germany, we find that there are 63 companies, whose amount of assurance in force is over \$1,986,000,000, and whose total accumulated funds are more than \$867,600,000. In France there are 16 companies, whose amount of assurance in force is \$688,470,000, and their accumulated funds are over \$399,300,000.

How, then, is the enormous advantage in progress of the American companies to be accounted for? The answer is, by American enterprise and industry. There are men living who have observed the progress of life assurance in America during the last half-century who can testify to the truth of this assertion. I think it will be generally admitted that the late Henry B. Hyde, the founder of the Equitable Life Assurance Society of the United States, and afterward its president, more than any other one man injected a spirit of aggressive energy into the business. From the time that he entered the field, what had theretofore been an easy-going and sluggish conduct of life assurance affairs became an active, vigorous, competitive administration. The ingenuity of mathematicians and business men began to be taxed to devise methods in connection with assurance which would make it more popular and divest it of many onerous conditions which had grown up in the past; and the ambition of individual propagandists to extend the blessings of life assurance began to be stimulated in a way then altogether unprecedented. The method of accumulating dividends of profits for the benefit of persisting policy-holders during long periods, thus making an advantageous offset to the burden of long-continued payments of premium, became one of the features of American life assurance, and appealed naturally and successfully to the keen American mind.

It was formerly the custom, not only in Europe, but in America, for life companies to keep the widows and other beneficiaries of deceased policy-holders waiting for periods varying from 3 to 6 months after the death of the bread-winner before the money on the policy could be availed of, while lawyers searched for reasons to escape payment. In America this practice has become almost a dead letter. Companies which do not unhesitatingly pay at once upon the death of the assured cannot hold their own in competition. One company advertises every year the promptness with which its claims have been paid, showing in 1902, for example, that nearly 81 per cent of its death losses were paid within a day after the proofs of death were submitted, and more than 91 per cent of the whole within one week thereafter.

Another concession of American companies to the rights of the assured has been what is known as the "incontestable feature," by means of which the company estops itself from making any resistance to the policy on any ground whatever, except non-payment of premium, after it has been in force for one year. This has been one of the most radical, and at the same time reasonable, reforms in American life assurance. It has abolished all that narrow quibbling which too often characterized the action of life assurance companies in former times, and has placed the responsibility on the companies of

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discovering frauds and mistakes within a brief period after the assurance is issued, and usually during the lifetime of the party most concerned.

Space does not admit of a further pursuit of this examination. The healthful innovations brought about by rivalry in competition have been so numerous and so important as to make the policies of American companies extremely attractive, even to those living in foreign countries, and it is a tribute to the enterprise and skill of American life underwriters that several of them have "carried the war into Africa," so to speak, and established their business in Great Britain, Germany, France, Russia, Spain, and, indeed, in all distant lands. The three largest companies of the United States have for many years been transacting business in foreign countries, and had assurance in force in these countries at the end of 1902 amounting to \$874,488.

American life assurance is on a footing as firm as that of any business in the world. There are degrees, of course, of excellence represented in the management of American companies, but taking not only the more successful but the average of the institutions, it may be confidently asserted that no safer or more carefully conducted financial enterprises exist.

The number of persons holding policies in the American companies of all kinds at the present time is probably upward of 20,000,000. Of these, say, about 1¼ per cent, or 250,000, may be taken as the number dying in a year. Taking five persons as the average number in each family, there would remain an average of four beneficiaries on the death of each person assured, or about 1,000,000 persons in 1902 benefited by the payment of about \$192,000,000 in death losses by all the companies. As a means of distributing wealth, and protecting the unfortunate at the cost of the more fortunate, nothing could be devised which would more nearly approach the ideal than the American system of life assurance. And all these figures are annually increasing.

There are probably between 40,000 and 50,000 men and women making their living as agents in propagating the business of life assurance in the United States. These industrious people are veritable missionaries for the highest good, and in these days when there is so much discussion as to the most feasible way of arresting poverty and encouraging thrift, the study of life assurance as practised in America by the companies which have worked out such an example to the world would repay the time and attention given to it on the part of every intelligent citizen who loves his country and his kind.

JAMES W. ALEXANDER,
President Equitable Life Assurance Society.

Insurance, Marine. American marine insurance business had its birth at about the close of the 18th century, but suffered heavily when the American flag began to disappear from the high seas. For the past quarter of a century it has had a hard struggle to keep itself anywhere near the old standard of prosperity. To do this it has had to draw for the greater part of its returns upon foreign commerce, and been forced to compete with English companies.

New York's marine-insurance history is that of all the other seaboard States, for in nearly all marine insurance once flourished, but has now

succumbed to English competition. The golden period of American marine insurance was between the years 1840 and 1860, when the clipper sailing ship was developed and perfected. In those times the leading merchants owned their own ships, and frequently a member of the firm would go to China or the East Indies to supervise the proper distribution of the cargo, and to secure a remunerative one for the return. The ship and cargo were insured with an American company, and as it might be as long as nine months before the vessel was heard from, the risk was considerable and rates were high. As much as five or six per cent was charged for insurance in those times. The rate on dry goods from Liverpool to New York in the old packet sailing ships was placed at two per cent. This trade was carried in American ships, and the insurance, both on the vessel and on the cargo, was naturally placed in American companies.

But the rates of insurance have changed with the transformation of the ocean-carrying service. The East India goods are now shipped across the Pacific to San Francisco, and thence east via rail. The cost of insurance on these is now only three quarters of one per cent. Rates on the Atlantic have likewise declined. Insurance on dry-goods and like merchandise carried in the modern "liners" is placed at two tenths of one per cent. In other classes of goods depreciation in rates is in like proportion.

Marine underwriters do not ascribe the decline in American marine insurance to any trouble from unwise laws or legislative interference, but to the changed business conditions and to English competition. The bulk of the carrying trade of the world has passed into British hands, and a British merchant and ship owner insures in a British company. The English marine companies have, as well, invaded American soil, and have secured a large portion of the American business. When the English companies first established themselves in America, along in the early seventies, they began cutting rates. The American companies did not effect any combination to prevent this, but followed their example. The American companies were also placed somewhat at a disadvantage by the laws governing the admission of foreign marine-insurance corporations. The foreign companies are required to make a deposit before they can write American business; but in New York State, which has stringent insurance laws, the amount is fixed at the minimum capitalization allowed a home company, namely, \$200,000. So much of the carrying trade of the world is done under the British flag and with the aid of British credit, and with countries under British control, that the American underwriter, working against all these disadvantages, is seriously handicapped. Therefore, there being no national or local tariff associations among marine underwriters, the American companies are worsted in this rate war. There are now not enough of them to form any sort of an association which would wield much power.

Despite the work of the American companies to hold their own, through loss of prestige on the ocean and active rivalry on land there are a number of stock and mutual American marine-insurance companies which continue to do a flourishing business. The largest and one of the oldest is the Atlantic Mutual of New York, which has over \$12,000,000 of assets, and has

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been most carefully managed throughout its career. It was formed in 1842, at the time when many stock companies were turned into mutual companies, and by which change the profits accrue to the policy-holders instead of the stockholders. The company is noted for retaining its faithful and tried officers until their death. The late John P. Jones was connected with the company for 50 years, and was its president for 40. In his life-work of building up the company he was ably assisted by vice-presidents W. H. H. Moore and A. A. Raven, who have been with the company 30 and 40 years respectively. Among the other large companies which still do a thriving business are the two Boston corporations, the China Mutual and the Boston Marine.

There have never been many marine Lloyds in the United States, though this form of marine insurance has been most in vogue in marine underwriting in Great Britain. The origin of the term is both interesting and peculiar. The name of Lloyd originated in old Lloyd's Tavern, in Tower Street, London, far back in the days of Queen Anne. It was the practice of many ship-owners and traders to drop in at the tavern and talk over their prospective profits; and gradually a custom developed of inscribing their names on a blackboard, certifying that the men signing would be jointly liable for the loss of a vessel during a certain voyage. From this crude beginning have grown the world-famous associations in the British Isles. In the United States there are a few Lloyds, two of the principal ones being located in New York—the United States Lloyds and the New York Marine Underwriters.

The scope and definition of a marine policy is, of course, entirely different from a land fire policy. The risks insured against are many, and may be summarized as including all perils of the sea. There are two classes—a voyage and a time policy; the former is generally used in insuring vessels, and the latter for cargoes. There are naturally many clauses governing marine-insurance policies, such as capture, seizure, war, and so on. The life of the insurance on a ship begins at the port from which it is insured until moored for 24 hours at the port to which it is insured. When an insurance is made on freight to be carried under a charter, the policy attaches as soon as the vessel sails, although she may be destined to a distant port for her cargo.

Though single losses to marine underwriters have been small, compared with some of those of fire underwriters, there have been shipwrecks that have lived in marine-insurance men's memories. One of the greatest losses to American marine insurance was that of the American steamer Central America, which foundered off the Cuban coast in September 1857. The Central America was bound from Aspinwall, now Colon, to New York, and was loaded principally with treasure from the California gold-mines. She carried insurance amounting to between \$700,000 and \$800,000, all of which had to be paid by American underwriters. Another notable loss was that of the steamer Erie, which sailed from Pernambuco, Brazil, loaded with coffee, on 1 Jan. 1893, and was burned at sea. Coffee prices were high in those days, and the Erie went down with \$500,000 insurance.

Two losses which not only made inroads on the American marine companies, but which also

seriously crippled the growth of American steam transatlantic service, were the sinking of the steamer Arctic, off Newfoundland, in 1854, by collision, and the disappearance of the steamship Pacific, which sailed from Liverpool for New York in January 1856, and was never heard from. Both steamships belonged to the Collins Line, which was the first one to put on steam-vessels for the Atlantic trade. These early losses were particularly detrimental to American marine insurance, because the companies carried extremely heavy lines in those days. Among the recent heavy losses was that of the steamer Oregon, which was run into and sunk off the Long Island coast in 1886. American marine underwriters had between \$700,000 and \$800,000 on the Oregon's cargo. The loss of the Oregon also showed underwriters how quickly even a properly constructed iron ship sinks. The introduction of iron in place of wood for building vessels has not made any material difference in the rates of insurance, for iron has hazards which wood has not, and *vice versa*.

As to the future of American marine underwriting, it is difficult to prophesy. As trade follows the flag, so marine insurance flourishes in the country with a prosperous merchant marine. The United States is again forging to the front as a great ship-building nation, and this gives American marine underwriters hope that American marine insurance may follow in the wake of the growth of American ship-building.

Insurance Patrol, an organization peculiar to New York and other large cities, which cooperates with the fire department, but is controlled by the combined insurance companies, who support it through the board of fire underwriters. The New York corps was organized in 1835, when there was an epidemic of incendiary fires. The patrol is provided with wagons and an equipment designed for its special work. Its most important service is in saving goods, which it does by removing them from burning buildings, or by covering them with rubber or oiled sheets, as a protection from water, dirt or cinders. In some cities it is known as salvage corps, or protective association.

Insurrection, the act of rising against governmental authority, active opposition to the power of the state. In the United States, power to suppress insurrections by employing the militia is given to Congress by the Constitution, Art. I., Sec. 8, Clause 15. In 1792 and 1807 acts were passed giving the President power to call forth the militia when notified by an associate justice of the Supreme Court or a district judge that the execution of the laws is obstructed, and on application of a legislature or a governor, when the legislature could not be convened, and to employ also the land and naval forces of the United States. The Whiskey Insurrection (q.v.) was directed against the Federal authority and the President employed force to suppress it on notification by the Federal judge. During the Buckshot War (q.v.), in 1838, between the Whigs and Democrats in Pennsylvania, the governor of that State asked for assistance, but it was refused. The governor of Rhode Island made a similar application during the Dorr Rebellion (q.v.) and the regulars were held ready for action, but their aid proved unnecessary. These last two cases came under Art IV., Sec. 4.

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of the Federal Constitution, which provides "that the United States shall protect" each State on application of the legislature, or of the executive (when the legislature cannot be convened), against domestic violence.

When the Civil War began the President was obliged to take prompt steps in calling out the militia, though no application had been made to him as required by the acts of 1792 and 1795. His action was justified by Art. II., Sec. 3, of the Constitution, providing that "he shall take care that the laws be faithfully executed," but Congress on 6 Aug. 1861 formally validated and made legal all of President Lincoln's previous acts, proclamations, and orders. The Force Bill (q.v.), of 20 April 1871 gave the President special power to use military force in certain contingencies. In the South during the reconstruction period, and subsequently in different places at the North, during riots in connection with strikes, the employment of Federal troops has entered as a significant feature into the history of our government.

In'tellect. See MIND; PSYCHOLOGY.

Intent, a legal term signifying the end or object which a person had in the performance of an act, the making of an engagement, or the drawing up of a will. Generally the legal consequences of an act are considered quite independently of the intention of motive of such an act. A wrong done to the person or property of another is punishable at law without consideration of the intentions of the person committing the violence or trespass. But when an engagement has been made by person, or a written disposition of property executed, the intention of the person making the engagement or signing the deed is fair matter for legal inquiry. In this connection a subsequent stipulation by word of mouth is not competent to nullify or modify the terms of a written engagement. Intent also forms an important part in suits for defamation, fraud and negligence. Negligence must have intent to make it criminal, so must defamation and fraud and malicious mischief. Consult Thayer, 'Preliminary Treatise on Evidence' (1898); Black, 'Construction and Interpretation of Laws' (1896); Hardcastle, 'Rules which govern the Construction and Effect of Statutory Law' (1900).

Intent, in psychology, according to James, is that which intelligent consciousness "means or intends"; the intent is a feeling in consciousness which is usually identified or practically identical with the object of consciousness at a particular time. By others, however, the word intent is meant to apply to a certain point of view from which an object may be regarded. Thus when our conscious processes have a unity of interest, there is, as a rule, a certain amount of unity of object. If the interest is divided, more particularly to the attainment of a definite or a vivid knowledge, the object as it becomes more perfectly known is identical with the object as previously less perfectly known; and as one's conscious thought is directed constantly toward the object, it receives, little by little, further and further definite specification, the detail being more or less in the background; yet the detail is all the time in consciousness, as it were inevitably associated with the object itself. The detailed object, considered by Baldwin as the goal of conscious en-

deavor, may be appropriately called the intent of consciousness, for he says "it is what the mind consciously means or intends but has not attained." The end pursued becomes defined in the pursuit of it, and so far as it is yet indefinite, and therefore only partially developed in consciousness, it is an intent. Consult Baldwin, 'Dictionary of Philosophy and Psychology,' Vol. I.

In'tercolumnia'tion, in Greek architecture, the space between two columns. This space is measured in diameters of the foot of the column. Vitruvius mentions five varieties of intercolumniation. These are the *pycnostyle* (that is, with columns thickly ranged) of one diameter and a half, which are least frequently found; the *systyle* (that is, with columns harmoniously ranged) of two diameters, the *diasystyle* (that is, with columns far apart) of three diameters, the *areostyle* (that is, with columns sparsely ranged) of four diameters; and the *eustyle* (that is, with columns a due distance apart) of two and a quarter diameters.

Intercontinent' al Railway, or Pan-American Railway, a proposed line of standard gauge, to connect the railway systems of the United States and Mexico with those of the Argentine Republic, utilizing as far as practicable existing systems in Central and South America. At the first International Conference of American States, held in Washington (1889-90) the committee on railway communications said in their report, "That a railroad connecting all or a majority of the nations represented in this conference will contribute greatly to the development of cordial relations between said nations and the growth of their material interests." President Harrison on 19 May 1890 recommended that Congress should make an appropriation for the share of the United States in the expenses of a preliminary survey. Congress complied, and the Intercontinental Railway Commission began its work with A. J. Cassat as chairman and H. G. Davis at the head of the finance committee. The commission spent about \$360,000 for surveys, maps, etc., three corps of engineers making experimental surveys between the north of Guatemala and Argentina in 1892, 1893, and 1894. It was found that the approximate length of the line to connect the south-eastern boundary of Mexico with Buenos Ayres would be: in Guatemala, 230 miles; Salvador, 220; Honduras, 70; Nicaragua, 224; Costa Rica, 363; Colombia, 1,372; Ecuador, 635; Peru, 1,671; Bolivia, 774, and Argentina, 1,143; total, 6,702. The distance from New York to the Guatemalan frontier is 3,769 miles, and thus the total from New York to Buenos Ayres is 10,471 miles. Links between the termini of the Argentine and Mexican systems: In Bolivia, 192 miles; in Peru, 151 miles; in Nicaragua, 31 miles; in Salvador, 20 miles; in Guatemala, 30 miles. This statement shows that about half of the distance between New York and Buenos Ayres was covered by railways then existing. On 27 Nov. 1901 the Pan-American Railway committee of the Second International Conference held in Mexico City stated that "some additional railroad has been built that could be utilized as a part of a continental system"; that not more than 5,000 miles of road would have to be constructed to establish railway communication between the systems of North and South Amer-

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ica; that \$200,000,000 would be ample for this work; and that the surveys made by the engineers of the commission demonstrated the practicability of constructing all of the missing links. The concluding assertion, however, should be received with caution. In Central America the proposed line runs along the volcanic coast; on entering South America it is continued among the enormous volcanic Andes, still paralleling the Pacific shore, but further inland. Recommendations made by the committee on 27 Nov. 1901 were that a permanent committee on Pan-American Railway should be appointed "to further the project after the adjournment of the conference"; also that the United States should take the lead in sending "competent and reliable persons whose duty it shall be to determine accurately the resources of the different countries and the condition of railway lines in operation . . . and the prospects for business for an intercontinental line . . . and also to ascertain what concessions or assistance each of the respective governments is willing to grant to the enterprise." The permanent committee appointed by the president of the conference comprised Ex-Senator Henry G. Davis and four others. A special commissioner was sent to the Latin-American republics, as suggested.

In'terdict, an ecclesiastical decree which forbids the performance of certain acts of public worship. When an interdict was laid upon a town, district, or country, all the churches were closed, the bells were silent, the sacraments, except infant baptism and extreme unction (and sometimes even these), were withheld, the rites of burial were not performed, and all the public ceremonies of religion were suspended. Interdicts may be general, as applied to a country or city; particular, as applied to a parish or diocese; personal, as applied to a person, or some class of persons. The bishops seem to have anciently exercised the right of publishing interdicts; for in 870 Hincmar, bishop of Laon in France, issued one against a parish in his diocese. One of the earliest censures of this sort on record was imposed upon the city of Rouen in the 6th century on account of the murder of the Archbishop Pretextatus by order of Queen Fredegonda. In 997 Gregory V. laid the kingdom of France under an interdict because King Robert had married his cousin, and the king was abandoned by most of his court. The same penalty was inflicted upon the kingdom of England under Stephen (1147) by Eugenius III., under John (1207) by Innocent III., under Henry VIII. (1535) with little effect by Paul III., and under Elizabeth (1587) by Sixtus V. Adrian IV. laid Rome under an interdict for the purpose of compelling the Romans to drive out Arnold of Brescia. Gregory IX. made use of the same instrument of compulsion in his quarrel with the emperor Frederic II. During the middle ages the interdict was a powerful engine of attack for the popes in their contests with sovereigns, as the popular dread of its effects was so great that kings were often forced by rebellions to submit to almost any conditions in order that it might be taken off. From the time of the reformation general and local interdicts have become rare. When Paul V. laid Venice under an interdict in 1606, the churches were not

closed, and only a minority of the bishops submitted to it.

Interest ("it concerns"—the party in issue—originally an award of damages, later used to evade the anti-interest laws), a charge for the use of money, by custom computed annually, on a basis of so many out of each 100 units loaned; but without diminishing the capital. It is possible to pay interest without loss, because, under conditions now general, the borrowed money can be employed in productive industry, from which a return equal to or greater than the interest can be obtained; or because comfort, prestige, or moral advantages of many kinds are derivable, justifying the expenditure when enough is left. Such borrowing is now useful on the whole, because civilization has ingrained a self-restraint in the masses which makes them in most cases manage money soberly and prudently. But in the early ages this was not so, except in a few developed commercial cities: Babylon carried on business by interest loans, and even bottomry bonds on shipping. Tyre probably did so, the great Athenian commerce was built up entirely by it, as Demosthenes explicitly says, but the mass of people were not fit to have the use of money, had no remunerative employment for it, and borrowed it only to use in self-indulgence, or in desperation because any rate was a choice of evils. There was little property to pledge, and the security was mostly the debtor's person; foreclosure meant selling him for a slave, and the grievance which called for Solon's legislation was the debt-slavery of a large section of the citizens. Hence arose a violent prejudice against the system altogether, as immoral in itself; the law of Moses prohibited it between Jew and Jew; Aristotle says it is essentially immoral, because money cannot breed money (this in the age of Athenian commerce), and never was meant for any such use; the Christian Church inherited the reprobation from the Jewish, and for many centuries forbade its members to take "usury" (money for the use of money, that is, interest at any percentage), and the secular laws were correspondent. In England interest did not become legal till the time of Henry VIII., but had been actually practised for many generations, by legal fictions of partnership or breach of contract, etc.; previously it was in the hands of the Jews—who were so indispensable as financial agents that a Jew who was converted to Christianity had all his property confiscated—and later of the Lombards. The first English permissive statutes fixed 10 per cent as the legal limit that might be charged; early in the 17th century it was set at 5. No serious doubt of the power of governments to regulate the current rate of interest obtainable was entertained till Bentham wrote his 'Defence of Usury' in 1786, proving that the laws could not possibly have any effect; because if the legal rate fixed was equal to or greater than the current rate it could not work any change in it; and if less, holders of money would not lend without obtaining their price plus an insurance for the risk of legal punishment. The doctrine was violently disliked, and has not even yet overcome the determination of the mass to show their dislike of usury by statute, or their belief that they can affect rates; but in a few American States of late years the anti-usury laws have been abol-

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ished. Of course a legal rate is always provided in default of contract.

Interest is not a natural right, but a matter of law or contract. The holder of a note payable without stipulation of interest cannot claim any until the note has become due and remains unpaid; thenceforward it draws money at the legal rate. The United States pays no interest on its debts, except where bonds are issued specifying it.

Of the separate States and Territories there is no legal restriction on the rate allowable by contract in Arizona, California, Colorado, Connecticut, Maine, Massachusetts, Nevada, Rhode Island, Tennessee, Utah, or Washington; the legal rate in each is 6 per cent except with Colorado (8), Nevada (7), Utah and Washington (8). The others have rates as follows, the legal rate coming first, then the contract rate permitted: Alabama, 8, 8; Arkansas, 6, 10; Delaware, 6, 6; Florida, 8, 10; Georgia, 7, 8; Idaho, 7, 12; Illinois, 5, 7; Indiana, 6, 8; Iowa, 6, 8; Kansas, 6, 10; Kentucky, 6, 6; Louisiana, 5, 8; Maryland, 6, 6; Michigan, 5, 7; Minnesota, 6, 10; Mississippi, 6, 10; Missouri, 6, 8; Montana, 7, 12; Nebraska, 8, 8; New Hampshire, 6, 6; New Jersey, 6, 8; New Mexico, 6, 12; New York, 6, 6; North Carolina, 6, 6; North Dakota, 6, 12; Ohio, 6, 8; Oklahoma, 7, 12; Oregon, 8, 10; Pennsylvania, 6, 6; South Carolina, 7, 8; South Dakota, 7, 12; Texas, 8, 10; Vermont, 6, 6; Virginia, 6, 6; West Virginia, 6, 6; Wisconsin, 7, 10; Wyoming, 8, 12. The rates in the District of Columbia are 6, 10.

That these provisions are more the result of tenacious tradition than of any very exact reasoning is shown by their terms. Only in three States—Illinois, Louisiana, and Michigan—has there been any recent attempt to keep down by law the rate of contractual interest to the rate actually current in the community; in the others, unspecified debts bear 6 to 8 per cent interest while the current rate is 5. As to the contract interest, 11 States stick to the attempt to forbid anything beyond the legal rate; but that assumed interest being above current rates, some leeway is left. One of these, moreover—New York—favors its peculiar interest by allowing any contract rate on "call loans" over \$5,000. Sixteen make the rate so high—from 10 to 12 per cent—that any one with the least pretense of credit or security can contract freely; above that, we have to deal with pawnbrokers and "fences," the former protected by tacit allowance, the latter amenable only to criminal legislation.

The theories of interest, like most economic principles, are much disputed by economists. The chief theories are those of "abstinence," holding interest to be a reward of abstinence from using up the capital in enjoyment (a variant of this regards it as a result of the general appreciation of the present above the future); of "productivity," holding it to be the return for production by capital in the same way that wages are a return for production by labor; the combination of the two, regarding the return as fixed by supply and demand, the latter depending on productivity and the former on abstinence; and the "monopoly" theory, which considers it a toll levied on the product of labor by the capitalists who control the means of production.

Interest, in psychology, is a term by which at least two or three different things may be meant. On the one hand interest may be defined as the consciousness which accompanies mental tendencies of any sort so far as they are concentrated on mental objects. It is manifested by a certain amount of voluntary attention to which it may be considered a stimulus. The exploiting habit, curiosity, the desire to know, may be defined as primary forms of interest, as distinguished from custom and habit and one's way of regarding things, the former being regarded by Baldwin in the nature of a stimulus to the intellectual function, the latter as frequent performance of a process.

The word also, in the vulgar sense, applies loosely to what is meant by personal advantage; as, for instance, it is "to a man's interest" to obtain such and such.

In pedagogics interest is often looked upon as a form of amusement, a stimulus through the play-instinct to induce intellectual effort. In the science of teaching, the ideal is to awaken an interest in the ends for which pupils study, and that a permanent interest in the ends should be fostered through the means. Baldwin well says that when interest attaches to the end, but not to the means of reaching it, we have drudgery, as in the case of workmen who think only of the dollar, taking no interest in the labor that wins it; on the other hand, when there is interest in the means, but not in the end, we have play, we do not work. When, however, there is interest in the end to be obtained, and also in the means for reaching the end, the ideal of work desirable in education is reached. See Herbart, 'Science of Education'; 'Doctrines of Interest'; Baldwin, 'Story of the Mind'; 'Educational Review,' Vol. X.; Baldwin, 'Dictionary of Philosophy and Psychology,' Vol. I.

Interference, in physics, is a phenomenon exhibited by wave motion of all kinds, and consists in the coming together of waves having different phases, in such a way that the effects of the waves are either increased or diminished. Interference may be observed when two different trains of waves come together upon the surface of water or any other liquid. Where the crest of a wave belonging to one system coincides with the crest of a wave of the other system, the elevation of the water surface is sensibly equal to the sum of the heights that the separate waves would have if each existed in the same place alone. When a crest of one of the waves coincides with the trough of another, the disturbance of the water surface is reduced, and the elevation (or depression) which results is equal to the difference between the elevation of one of the component waves and the depression of the other one.

The kinds of interference that are of the greatest practical importance in physics are those which occur among sound waves, or among waves of light. The phenomena in these cases are ultimately of the same general sort as those observed upon the surface of water. In the case of sound, interference may even produce entire silence in certain regions, when two trains of sound waves, of equal intensity, are brought together in a suitable manner. A more familiar result of the interference of sound waves, however, is the production of "beats," when two or

INTERIOR — INTERNAL IMPROVEMENTS

more trains of waves, having but slightly different wave-length, come together while the two are moving in nearly the same direction. This phenomenon is exhaustively treated in Helmholz's 'Sensations of Tone,' and it also receives a more or less adequate treatment in all of the better works on physics.

The more familiar of the interference phenomena that are afforded by light are those which are observed in connection with soap bubbles and with very thin plates of transparent solids. Light, upon striking the soap bubble or the thin plate, is reflected toward the eye from both surfaces, and the trains of light waves that reach the eye from these two sources, since they have a slight difference of phase (which varies, moreover, from point to point of the bubble or the plate), interfere with one another so as to produce effects that are often very beautiful and striking. A soap bubble, when viewed by monochromatic light, often appears to be covered with dark striae; the dark lines being due to the fact that at the points that appear dark the two trains of light-waves, coming respectively from the inner and outer surfaces of the soap bubble, nearly or completely neutralize each other. When the bubble is viewed by white light, we do not commonly see the dark striae, their places being taken by bands of color. This is because the different colors that compose white light have different wave-lengths, so that at any given point in the bubble only a portion of the colors are destroyed by interference, leaving the remaining constituents of the white light to produce their full chromatic effect upon the eye. See LIGHT; SOUND; PHYSICAL CRYSTALLOGRAPHY.

Interior, Department of the, one of the executive departments of the United States government whose heads are cabinet secretaries. The "home department," long existent in all European governments, was only constituted in this country by act of 3 March 1849. Its functions had previously been exercised by bureaus or officials of nearly all the other departments: patents, copyrights, public documents, and the census belonged to the State Department; public lands, mines, and judicial accounts, to the Treasury; Indian affairs, to the War Department; and pensions to the War and Navy, each for its own pensioners. By later laws the Interior was given charge of education, public surveys (including the geological survey; but the coast and geodetic survey belongs to the Treasury), subsidized railroads, Territories, national parks and reservations, returns of public contracts made by several other departments, some charitable institutions in the District of Columbia, and a number of other matters. The secretary makes an annual report of the number of public documents received and distributed. He has a salary of \$10,000, and two assistant secretaries. His office has seven divisions: appointments, disbursements, lands and railroads, Indian affairs, pensions and miscellaneous, public documents, and stationery and printing. Although most of these are managed by commissions appointed by the President, their work is under the secretary's direction, and their reports are made through him. Most of the clerks and subordinate officers in the bureaus are appointed by him. All patents issued by the

United States must be signed by him. The first secretary was Thomas Ewing of Ohio.

Interlaken, in'tér'läk'ēn ("between the lakes"), Switzerland, village in the canton, and 26 miles southeast of the town of Berne, one mile southeast of Unterseen, beautifully situated near the left bank of the Aar, in the valley of Boedeli, between the lakes of Thun and Brienz. It contains a beautiful old castle and numerous hotels. It is visited annually by 80,000 to 100,000 tourists. Pop. about 2,500.

Internal Improvements, the construction and reparation of roads, bridges, canals, harbors, lighthouses, etc., at the expense of the United States government. The Constitution not having made any provision for such improvements, the execution of public works of this character became subject to the vicissitudes of party politics. Yet since 1789 funds have been perpetually appropriated by Congress for the carrying on of improvements throughout the country, so long as these lay strictly within Federal jurisdiction. Such would include lighthouses, buoys, beacons and public piers, rivers and harbors. The Federalist party, and after it the Democratic party, opposed all improvements on rivers and roads, the benefit of which passes to the several States. Yet in 1806 an appropriation was made for the construction of the Cumberland Road, which should penetrate the Western States and facilitate the mail service, as well as open up unsettled territory to the increasing tide of immigration, and serve for the transportation of troops and army supplies. The Federal Government, about the same time, undertook the construction of a road through Georgia toward New Orleans. In 1808 Congress passed a resolution in which it claimed the power to make appropriations for such internal improvements as the construction of roads and canals, and the maintenance and direction of water courses. Such roads and canals as the President should consider of Federal importance were ordered by Congress to be surveyed, and \$300,000 was subscribed to stock of the Chesapeake and Delaware Canal. But there was a wide difference of opinion with regard to the constitutionality of such legislative action, and in May 1822, President Monroe vetoed the Cumberland Road bill. He supported this procedure by the declaration that Congress had acted *ultra vires*. That body, he maintained, had no right under the Constitution to carry out such internal improvements at Federal expense. President Jackson in 1830 followed Monroe's example and vetoed the Maysville Turnpike Road bill. Henceforth, the matter of such internal improvements was left to the legislation of the various States. Jackson had somewhat mitigated the force of his veto by advocating the distribution of the Treasury surplus among the various States, but when the Whigs tried to put this into execution in 1841, President Tyler by his veto put a stop to any such attempts, and they have never since been repeated. The introduction of railroads under the management of private corporations did away with the call for road appropriations, although something like a bonus was given to the projectors of new lines by the vast grants of lands which were made to them. Tracts of 40,000,000 and 50,000,000 acres were thus transferred to railroad companies. At

INTERNAL REVENUE SYSTEM — INTERNATIONAL BROTHERHOOD

present both the great political parties are inclined to reclaim so much of the public lands thus granted, as has not been earned by a strict fulfilment of the conditions on which the grant was made. The appropriations for internal improvements under the head Rivers and Harbors for the year 1903 was \$32,540,199.50 as against \$7,046,623.00 in 1902.

Internal Revenue System, of the United States, properly all taxation except that of foreign goods at customs offices; but in use restricted to what were formerly termed excises (q.v.), on internal trade and manufactures, through a bureau of the Treasury Department, organized 1862. Before that time, though excises had been imposed, they were unpopular and brief. An intense dislike to them had been inherited from England, where they traditionally connoted an independent revenue for the sovereigns to free them from popular control, and arbitrary interference with private business and persons by irresponsible officials, the raw state of trade and manufacture in this country made a general excise system very injurious; and the customs dues amply provided for the expenses.

The first occasion when they were resorted to was just after the adoption of the Constitution. The assumption of the State debts, and other expenses of the new government, compelled Hamilton to recommend an excise, though in the 'Federalist' and elsewhere he had strongly urged its impolicy; he was also anxious to test the power of the government to enforce taxation, which the Articles of Confederation could not. On 3 March 1791 a bill was passed taxing distilled spirits of domestic manufacture. In the then West (western Pennsylvania) the still was like the New England cider mill, but much more important, because the long distances and bad roads made corn unprofitable unless condensed into whiskey, hence there was open revolt, which had to be put down by national troops (1794). Direct resistance ceased, but the tax was largely evaded, and it was two years before it was extended to Kentucky and Tennessee, while the collections in North Carolina were poor. In 1794 the system was extended in fear of a war with England, but owing to unskilful choice of articles or provisions in detail, the only one which produced much was that on sugar, from the high import duty, which gave the home market to the domestic manufacturers, so that what went into excise came off customs. Stamp taxes were laid in 1797, but were of odious associations. With the election of Jefferson as President the whole system came under ban, the Democrats having always opposed it, and on 6 April 1802 the entire internal taxes were repealed, with nearly \$700,000 outstanding and uncollected, and which remained so. The dislike was not to the taxes as such, but to the inquisitorial methods of collection involved; and this persisted. But the War of 1812 compelled a renewal of them: unfortunately they were laid so late that the war was over before they began to produce much. They were needed to pay off the war debts, however, and were retained till 23 Dec. 1817. Thence till the Civil War no internal tax of any kind was levied in the United States.

The first real "system"—for the others included but few articles—and which has become a standing part of our system of taxation,

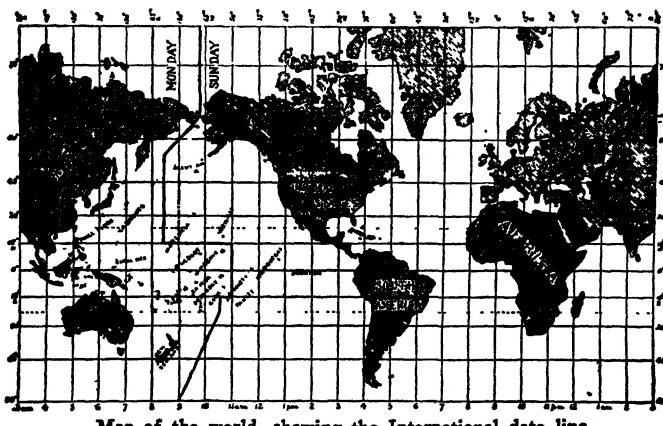
was inaugurated 1 July 1862, others followed, placing an enormous and very ill-distributed burden on the people, which they bore uncomplainingly for the end in view. It is almost too complimentary to call it a system, as it was an indiscriminate heaping of taxes upon every stage of every article, on labor and tools, raw materials and finished products, processes and professions. Articles paid sometimes a dozen taxes on the various stages, and another on the final one, before reaching even the wholesaler to begin a round of middlemen's profits. "The only principle recognized," says David A. Wells, "if it can be called a principle, was akin to that at Donnybrook Fair, 'Wherever you see a head hit it.' " "Wherever you find an article, a product, a trade, a profession, or a source of income, tax it!" Within the period 1861-7 no less than 25 revenue bills were passed by Congress. The incessant endeavor was to find new objects of taxation. The industrial effects of the sudden huge unequal burdens, and the political effects of the enormous revenue to spend at discretion, cannot be discussed here. The taxes did not begin to produce largely at once; in 1863 the receipts were \$37,640,787.95; in 1864, \$109,741,136.10; in 1865, \$209,404,215.25; in 1866, the summit, \$300,226,813.42. Then the items began to be stricken off, the total sinking by 1873 to \$113,729,314.14: able business men have attributed part of the inflation, and consequent panic, to the sudden removal of burdens to which business had adjusted itself. The next year it touched bottom, \$102,409,784.90. The taxes by this time had been reduced to about the present status, and tended to increase with the growth of the country, even rising somewhat through the bad years 1875-9. The income tax, though fairly productive—the height being \$37,775,873 in 1870—was dropped in 1872; no other tax was ever so unpopular, from its prying into private secrets, and its working through informers. It is also the one which bears hardest on the most heavily burdened class of the community, the moderately salaried men in various callings. Protection leaders have repeatedly urged or hinted at repeal of all internal taxes, to prevent any reduction of customs duties; but the moral feeling reinforces the economic sense of the people in insisting on liquors and tobacco being taxed. Attempts have been made to increase the revenue from liquors by raising the tax; but the result is the reverse, the premium on fraud being too great. In 1894 the income tax was re-established, but the Supreme Court decided it unconstitutional under its particular terms. On 1 July 1898, to provide for the expenses of the Spanish War, fresh internal taxes were laid; of which the most fertile were stamps on all mercantile papers, telegrams, etc., and on patent medicines, and wines, which yielded in the ensuing fiscal year \$43,837,816.66. Special taxes on bankers and amusements, and some other things, yielded several millions. The total receipts in 1899 were \$273,484,571.44. In 1901 and 1902 the new taxes were all abolished.

International Brotherhood of Maintenance-of-Way Employees, an American labor union, having a department of fraternal insurance. It was founded at Demopolis, Ala.,

INTERNATIONAL DATE LINE

in 1887, and had a membership in 1903 of 40,000. Since its organization the society has disbursed \$500,000 in death and disability benefits. It has secured increased wages for maintenance-of-way employees to the amount of \$6,000,000 annually. It was actively engaged in the great strike on the Canadian Pacific Railway in 1901. The strike was settled after a struggle lasting 11 weeks, with the understanding that all members of the brotherhood would be reinstated in their former positions within two weeks; the question of wages to be left to arbitration. Sir John A. Boyd, Chief Justice of Ontario, was chosen chairman of the Board of Arbitration and awarded the employees an increase of 20 per cent over previous wages. The brotherhood has secured trade agreements for its members from a number of the largest railway systems of the United States and Canada. It also holds a charter of affiliation with the American Federation of Labor, and publishes the 'Advance Advocate,' a magazine devoted to the interests of maintenance-of-way employees. See RAILWAY LABOR ORGANIZATIONS.

International Date Line, an imaginary line



Map of the world, showing the International date line.

drawn through the Pacific Ocean somewhat irregularly, but tending in a general northerly and southerly direction, and separating the islands of the Pacific Ocean in such a way that all those which lie to the east of it carry the same date as the United States, while all those on the west of it carry the same date as Japan and Australia. The nature of this line may be made clear by the following illustration: A traveler leaves New York city at noon on Sunday, and proceeds westward just as fast as the earth turns on its axis, so that he follows the sun in its apparent westward progress with such precision that he keeps it always directly south of him. It will be noon, therefore, at every place he passes. If, however, he asks the day of the week at every point of his journey, he will be told that it is Sunday at all points in the United States, and even as far west as Hawaii. This can not hold true indefinitely, however, because when he has gone entirely around the world, and has returned to New York, he will have been gone 24 hours, and will therefore be told that it is Monday noon. Everywhere in

Europe, too, he would have been told that it is Monday noon.

Yet it has always been the same day to him, and there must have been some place on the journey where he was told, for the first time, that the day was Monday instead of Sunday. At this place, if he wishes to be in accord with the people that he meets, he must arbitrarily change the name of his day from Sunday to Monday. Mariners are in the habit of making the change upon crossing the 180th meridian from Greenwich, England; but this fact is of no service to us if we wish to compare the date carried on one of the Pacific Islands with the corresponding date (say) at New York, because the mariners pay no attention to the local dates on the islands that they pass. The ideal way to find out where the date actually does change would be to canvass the entire Pacific Ocean, so as to find out what date is actually in use on every one of its islands at some given instant. A line drawn from pole to pole in such a manner as to keep all islands bearing one date on one side and all islands bearing the other date on the other side, would afford a perfectly definite basis for the comparison of dates, and would be the true "International Date Line."

No such canvass has yet been made. As a general rule, it may be said that the date now in use upon most of the different islands or groups, is the date which results from the one carried there by the first European or American colonists; and this date will presumably be different according as the colonists came from the east or the west. This is not true universally, however, because arbitrary changes in the date are known to have been made in a number of cases. For example, Alaska was first colonized by the Russians, who brought with them the Russian date. When the American settlers moved there, they carried with them the date of the United States, and this led to some considerable confusion, the Sunday of the Americans being the Monday of the Russians, in spite of the fact that the Russians still use the Julian calendar. In 1867, when Alaska was purchased from Russia, the date in use there was made to conform to that used in the United States. Again, the Philippines were discovered by Magellan, in 1521, and Manila was founded by Lagaspi in 1571. Magellan brought his date from the east, and after the islands were colonized they kept the same date as the Spanish possessions on the opposite side of the Pacific; and they therefore carried a different date from that prevailing on the neighboring Asiatic coast. This was changed in 1844, by the omission of the 31st day of December in that year from the Philippine calendar; this change bringing the date in use in the Philippines into harmony with that prevailing at Hong Kong and other Asiatic ports. The best data at present available indicates that the date line follows substantially the course shown upon the accompanying map,

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which is prepared from data furnished by the United States Naval Observatory. This date line is subject to modification, as our knowledge of the dates carried on the various Pacific Islands increases.

International Law, the law of nations; those rules or maxims which independent political societies or states observe, or ought to observe, in their conduct toward one another. International law is divisible into two heads: the one which regulates the rights, intercourse, and obligations of nations, as such, with each other; the other, which regulates the rights and obligations more immediately belonging to their respective subjects. Thus the rights and duties of ambassadors belong to that head which respects the nation in its sovereign capacity; and the rights of the subjects of one nation to property situated within the territory of another nation, belong to the latter head. Some of the maxims regarding the rights and duties of nations during a state of peace are:

1. Every nation is bound to abstain from all interference with the domains of other nations.

2. All nations have equal and common rights on the high seas, and they are not bound to admit any superiority there. The sea which washes the coast of a nation, to the extent of three miles, is now deemed to be a part of the territory of the nation, over which it may exercise an exclusive jurisdiction. And, in respect to persons subjected to its laws, every nation now claims a right to exercise jurisdiction on the high seas, for the purpose of enforcing both international law and its own municipal regulations.

3. No nation has a right to pursue any criminal or fugitive from justice in a foreign country; its claim, if any, is a mere right to demand him from the nation in which he has taken refuge.

4. Every nation has a right to regulate its own intercourse and commerce with other nations.

5. Foreigners are bound to obey the laws of a country as long as they reside within it, and under its protection; and the property held by foreigners within a country ought to be protected in the same manner as that of natives.

6. Every nation has a right to send and to receive ambassadors and other public ministers; and this right of embassy has always been deemed peculiarly sacred. Their persons are held sacred and inviolable. Their property, and servants, and retinue enjoy a like privilege.

7. It is through the medium of ambassadors and other public ministers that treaties, conventions, and other compacts between nations are usually negotiated, thus forming a positive code for the regulation of their mutual rights, duties, and interests. In the modern practice of nations such treaties and compacts are not generally deemed final and conclusive until they have been ratified by the respective governments to which the negotiators belong.

War introduces an entirely new order of rules. The right of declaring war results from the right of a nation to preserve its own existence, its own liberties, and its own essential interests. In a state of nature men have a right to employ force in self-defense; and when they enter into society this right is transferred to the

government, and is an incident to sovereignty. What are just causes for entering into a war is a question which has been much discussed by publicists. Defensive wars are necessarily justifiable from the fact that they involve the existence or safety of the nation and its interests. But offensive wars are of a very different character, and can be justified only in cases of aggravated wrongs or vital injuries. The first effect of a declaration of war is to put all the subjects of each of the nations in a state of hostility to each other. All the property belonging to each is deemed hostile. If it be personal property it may be captured as prize; if lands, it may be seized and confiscated at the pleasure of the sovereign; if it be merely in debts or stock it may, in the extreme exercise of the laws of war, be equally liable to confiscation. As soon as a battle is over the conquerors are bound to treat the wounded with kindness, and the prisoners with a decent humanity. And there are some things which seem positively prohibited from their cruelty and brutal barbarity; such are the violation of female captives, the torturing of prisoners, the poisoning of wells, the use of inhuman instruments of war. In time of war there is occasionally an intercourse between the belligerents which should always be held sacred. Thus the interchange of prisoners by cartels; the temporary suspension of hostilities by truces; the passage of flags of truce; the engaging in treaties of capitulation. When any conquest of territory is made the inhabitants pass under the dominion of the conqueror, and are subject to such laws as he chooses to impose upon them. There are also certain rights which war confers on the belligerents in respect to neutrals. Thus they have a right to blockade the ports or besiege the cities of their enemies, and to interdict all trade by neutrals with them. But no blockade is to be recognized unless "the besieging force can apply its power to every point in the blockaded state." They have a right also to insist that neutrals shall conduct themselves with good faith, and abstain from all interference in the contest by supplying their enemy with things contraband of war. And hence arises the incidental right of search of ships on the high seas for the detection of contraband goods. A neutral nation is bound to observe entire impartiality between the belligerents. Neutral nations are, strictly speaking, bound to compel their subjects to abstain from every interference in the war, as by carrying contraband goods, serving in the hostile army, furnishing supplies, etc. Subject to the exceptions above referred to, a neutral has a right to insist upon carrying on its ordinary commerce with each of the belligerents in the same manner as in times of peace. See DIPLOMACY; HAGUE CONFERENCE; NEUTRALITY.

International Law, Recent History and Development of. Nothing could better exemplify the fallacy of drawing from present ills despondent prophecies of evil than a comparison of the state of international law at the close of the 19th century with its condition at the beginning. The wars in the midst of which the century opened were not only world-wide in their effects, but they were characterized by a defiant disregard and systematic violation of the rules of international conduct. As early as 1793 both France and Great Britain, soon after the war broke out be-

INTERNATIONAL LAW

tween them, sought to interrupt the lawful course of neutral trade. With this object each power adopted measures the injurious effects of which were greatly aggravated by the irregular and arbitrary manner in which they were executed.

The Peace of Amiens proved to be but a brief truce, and after the war was renewed even greater excesses were perpetrated. The idea of conquering England by destroying her trade, though it did not originate with Napoleon, was the inspiration of his so-called Continental system. On 28 March 1806, Prussia, after taking possession of Hanover, published, in pursuance of her agreement with Napoleon, a proclamation which purported to close the ports of the North Sea, as well as all rivers running into it, against British ships and trade. The British government sought to retaliate by an Order in Council which declared the mouths of the Ems, the Weser, the Elbe, and the Trave to be in a state of blockade. Napoleon then issued his famous Berlin decree, by which he assumed to blockade the British Isles, and to prohibit all commerce and correspondence with them. Great Britain's response was an Order in Council not only forbidding neutral vessels to trade between ports in the control of France or her allies, but also forbidding them to trade, without a clearance obtained in a British port, with the ports of France and her allies, or with any port in Europe from which the British flag was excluded. Napoleon's answer was the Milan decree, declaring every vessel that had submitted to search by an English ship, or consented to a voyage to England, or paid any tax to the English government, and every vessel that should sail to or from a port in Great Britain or her possessions, or in any country occupied by British troops, to be denationalized and to be good prize. By these measures the right of neutrals to hold commercial intercourse with belligerents was virtually denied, each belligerent endeavoring under the guise of blockades, which existed only on paper, to prevent all trade that could not be made subservient to its interests. It is hardly conceivable that any power would now venture to assert such pretensions. They were at the time scarcely defended on legal grounds; and in the declaration of Paris of 1856, to which both France and Great Britain are parties, it is expressly recorded that "blockades, in order to be binding, must be effective." This rule is recognized as but the expression of a principle of international law. The illegality of paper blockades is to-day universally acknowledged.

No less important than the subject of neutral rights is that of neutral duties. The first authoritative formulation of the duties resulting from a state of neutrality is to be sought in the executive, legislative, and judicial acts of the United States in 1793 and 1794, during the first series of European wars growing out of the French Revolution. But on the foundations then laid there has been built up an elaborate and well-regulated system, the obligatory character of which is not now questioned. The comprehensive neutrality statute of the United States of 20 April 1818, became in the following year the model of an act of the British Parliament. From time to time laws and regulations were adopted by other governments, and the duties of neutrality became a determinate part of international law. The final vindication of the system as the ultimate standard of international

obligation and responsibility was made in the case of the Alabama claims.

In the discussion and practice of neutrality, rules have naturally been formulated as to what constitutes a state of belligerency, and as to the conditions under which it should be recognized. The recognition of belligerency presupposes the existence of a state of war in the international sense, and necessarily implies that the parties to the conflict may exercise toward each other and toward third powers such rights as war gives. But on or near the border line that divides peace from war there stands pacific blockade, a measure of recent invention, the precise legal position of which has not been authoritatively determined.

During the first half of the 19th century a fruitful subject of controversy was that of visitation and search. That belligerent cruisers might lawfully visit and search the merchant vessels of neutrals on the high seas, for the purpose of enforcing the observance of the laws of war, was on all hands admitted; but in certain cases, as in that of the impressment of seamen, the belligerent right of search was sought to be employed for other purposes; and it was even asserted that a right of search existed in time of peace, especially for the purpose of putting an end to the slave trade. These pretensions were vigorously resisted, especially by the United States. In 1858 the Senate unanimously resolved:

That American vessels on the high seas in time of peace, bearing the American flag, remain under the jurisdiction of the country to which they belong, and therefore any visitation, molestation, or detention of such vessels by force, or by the exhibition of force, on the part of a foreign power, is in derogation of the sovereignty of the United States.

"After the passage of this resolution," said Mr. Fish, as secretary of state, "Great Britain formally recognized the principle thus announced, and other maritime powers and writers on international law all assert it."

It would be difficult to overestimate the importance, both theoretically and practically, of the establishment in the 19th century of the freedom of vessels on the high seas from visitation and search in time of peace. It was the acknowledgment of this principle that made the seas really free and gave freedom to commerce. Nor does the freedom of the seas become less important with lapse of time. As a principle it grows rather than diminishes in the estimation of mankind; for, in the light of history, its evolution is seen to mark the progress of commerce from a semi-barbarous condition, in which it was exposed to constant violence, to its present state of prosperous security.

Closely related to the principle of the freedom of the seas is the question of the navigation of the narrow channels by which they may be connected. This question has been discussed in respect to natural channels in several cases, the most notable of which was that of the dues charged on vessels and their cargoes passing through the Danish Sound and Belts. By treaties made with the interested powers, in 1857, Denmark relinquished the dues, the powers paying her a lump sum, in consideration not only of her renunciation of her claims to tolls, but also of her agreement to maintain such lights, buoys, and pilot establishments as the trade of the Baltic might require. An artificial channel necessarily involves special considerations. Its

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construction requires the expenditure of money and gives rise to proprietary rights; and it is not denied that those rights may be asserted by the exaction of tolls. In this respect the navigation of the artificial channel obviously cannot be free. But, though it cannot be said that the subject has been authoritatively settled as a part of international law, a tendency has been shown in the case of great international highways to act on analogies and to make the artificial channel free in the sense that it shall be open to the ships and merchandise of all nations on equal terms.

While the right freely to navigate the seas has been established, a great advance has been made toward assuring the free navigation of waters flowing into the sea in cases in which they wash in their navigable course the territory of two or more states. By the treaty of Vienna of 9 June 1815, it was agreed that rivers which separated or traversed two or more states should, along their whole navigable course, be, in respect of commerce, entirely free to everyone, subject to regulations of police. This principle was applied primarily to the Rhine, but was also expressly extended to the Neckar, the Main, the Moselle, the Meuse, and the Scheldt. With a limitation of the right of free navigation in some instances to the citizens or subjects of the riparian powers, similar stipulations may be found in treaties relating to the rivers and canals of the ancient kingdom of Poland; to the Elbe, Po, Pruth, Douro, Danube, and other rivers in Europe; and to the rivers La Plata, Paraguay, Uruguay, St. Lawrence, Yukon, Porcupine, and Stikine in America. By an imperial decree of 7 Dec. 1866, the government of Brazil opened "to vessels of all nations," after a certain day, the Amazon as far as the frontiers of Brazil; the Tocantins, as far as Cameta; the Tapajos, as far as Santarem; the Madeira, as far as Borda; the Negro, as far as Manáos; and the San Francisco, as far as the city of Penedo.

The principle of freedom, which has been so widely extended in commerce and in navigation, has also been acknowledged in matters of government. Such an acknowledgment may be seen in the established rule that new states and new governments are entitled to recognition on the ground of their *de facto* existence. The old theory of legitimacy and divine right found its last practical assertion in the acts of the powers composing the Holy Alliance, who, in their various circulars, associated "revolt and crime," denounced "as equally null and disallowed by the public law of Europe, any pretended reform effected by revolt and open force," and announced their determination "to repel the maxim or rebellion, in whatever place and under whatever form it might show itself." Their acts corresponded with their words; but they were soon forced by the progress of events to abandon their ground, and to admit in practice the principle which they had condemned.

In the last 100 years there has been witnessed a change in the law relating to the acquisition of territory by occupation. In former times, when so large a part of the world was unsettled, great weight was given to the mere fact of discovery. Under the papal bull of 1493, and the Treaty of Tordesillas of the following year, Spain and Portugal sought to divide between themselves on that ground the whole

unknown world. Even the early English charters asserted the British title to extend from the Atlantic to the Pacific. In the 19th century, and particularly in the latter half of it, the powers, especially in respect to territorial claims in Africa, recognized more clearly than was ever done before the necessity of actual and effective occupation as the basis of permanent national title.

In the system of extradition, which is chiefly the development of the 19th century, we find one of the many evidences of the growth among nations of a clearer perception of the duty of promoting common social ends. In former times there existed a strong repugnance to the surrender of fugitives from justice. This was due partly to the ancient idea of asylum, partly to perverse notions of national dignity, but perhaps in largest measure to ignorant and groundless prejudices. It was not, indeed, until the middle of the 19th century that the great expansion of the system may be said to have begun. Since that time, however, its growth has been rapid and far-reaching.

An increasing tendency to acknowledge the force and supremacy of law may be seen in the growing frequency of arbitrations for the settlement of disputes between nations, not only as to the rights of individuals, but also as to their own rights, as well as in the recent efforts to establish a permanent system of arbitration, as proposed in the plan of the International American Conference (1890), in the unratified treaty between Great Britain and the United States (1897), and in the convention adopted at The Hague (1899). During the 19th century there were, exclusive of cases still pending, at least 136 international arbitrations. Probably there were more, though certain lists lately circulated, by which the number appears to have been vastly greater, are quite inaccurate, since they include not only numerous cases of mediation, but also ordinary boundary surveys, domestic commissions, and even pure diplomatic negotiations. Both in number of arbitrations and in importance of the questions involved in them, the United States and Great Britain easily lead the way.

There are two modes in which international law may be developed. The first is the general and gradual transformation of international opinion and practice; the second is the specific adoption of a rule of action by an act in its nature legislative. The operation of the former mode it is often difficult to follow in its details, but its effects are potent and undeniable. Perhaps its clearest and most definite exposition may be found in the opinion of the Supreme Court of the United States in the case of the Spanish fishing-smacks, the Paquete Habana and the Lola (the Paquete Habana, 175 U. S. 677). The particular point decided was that coast fishing-vessels, with their implements and supplies, cargoes and crews, unarmed and honestly pursuing the peaceful calling of catching and bringing in fresh fish, are exempt from capture as prize of war. In reaching this conclusion, the Court considered the question whether the exemption was merely a matter of "comity," or whether it was a matter of legal right to which the Court was bound to give effect. In behalf of those who sought the condemnation of the vessels there was cited an opinion of Lord Stowell, in which it was said to be "a rule of comity only, and not of legal decision." With reference to this statement, Justice Gray,

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who delivered the opinion of the Supreme Court, said:

The word "comity" was apparently used by Lord Stowell as synonymous with courtesy or good-will. But the period of a hundred years which has since elapsed is amply sufficient to have enabled what originally may have rested in custom or comity, courtesy or concession, to grow, by the general assent of civilized nations, into a settled rule of international law. As well said by Sir James Mackintosh: "In the present century a slow and silent, but very substantial mitigation has taken place in the practice of war; and in proportion as that mitigated practice has received the sanction of time, it is raised from the rank of mere usage and becomes part of the law of nations."

The importance of this judicial declaration, in its bearing on the development of international law, it is difficult to overestimate. Even the most eminent judges have seemed at times to labor under the impression that it was somehow the peculiar prerogative of a remote age to fix by its customs, however rude and barbarous they may have been, an immutable law in comparison with which the practices of modern times are merely "comity" or "courtesy," which may be discarded at will. The enlightened declaration of the Supreme Court, which was the very foundation of its decision, should have a potent effect in clearing away the misconceptions on which many well-known dicta, of an opposite effect, are founded.

The last century was, however, specially distinguished for the modification and improvement of international law by what may be called acts of international legislation. Among the sources of international law the publicists commonly enumerate the stipulations of treaties. Where a certain rule of action is uniformly embodied in a succession of treaties between the leading powers of the world, it assumes in course of time the character of a principle of international law. But in the latter part of the 19th century, immediate and important results were directly produced by means of international conferences.

Allusion has already been made to the effort of the Congress of Vienna to establish the free navigation of international rivers as a general principle. By the same congress an important contribution to international law was made in the form of rules to regulate the rank and precedence of diplomatic agents. By those alone who are familiar with the annals of diplomacy can the delicacy and interest of this subject be fully appreciated. It had probably given rise to more disputes and caused a greater waste of time than any other within the whole range of international relations. The rules of the Congress of Vienna, slightly modified by the Congress of Aix-la-Chapelle in 1818, were accepted by all the powers which then composed the international circle. They divide diplomatic agents into four classes: (1) Ambassadors, legates, and nuncios, who, in a sense, specially represent the person of the sovereign. (2) Envoyos, ministers, or other persons accredited to sovereigns. (3) Ministers resident, accredited to sovereigns. (4) Charges d'affaires, accredited to ministers for foreign affairs.

Yet more remarkable as an act of legislative aspect was the declaration on maritime law made by the Congress of Paris of 1856. The declaration embraced four rules:

- (1) Privateering is and remains abolished.
- (2) The neutral flag covers an enemy's goods, with the exception of contraband of war.

(3) Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag.

(4) Blockades, in order to be binding, must be effective, that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy.

The fourth rule may, as has heretofore been observed, be considered as merely declaratory of international law; for publicists had ceased to defend the paper blockades of the Napoleonic era. The third rule may also be classed as declaratory, since it was generally observed in the absence of a treaty stipulation to the contrary. But by the first two rules it was proposed to give the character and force of law to principles which had previously been obligatory only where they were made so by express treaty. This element in the situation was acknowledged in the declaration itself, in which the signatories announced their purpose to invite the adhesion of other powers with a view "to establish a uniform rule." The powers invited to adhere embraced practically all those within the sphere of international law; and, with the exception of the United States, Spain, and Mexico, they accepted the declaration in its entirety. Those three powers objected to the naked inhibition of privateering on the ground that, so long as the maritime capture of private property was recognized as lawful warfare, such an inhibition would give undue advantage to great naval powers, but the United States offered to go further and accept the entire declaration, if it were so amended as to exempt private property at sea from capture, save in the cases of contraband and blockade. All the powers approved the second rule and it is now a principle of international law. It was so announced by the United States and Spain at the outbreak of the recent war between them.

Since 1860 numerous attempts have been made by means of international conferences to legislate on the modes of conducting warfare. On 22 Aug. 1864, there was concluded at Geneva the famous convention for the amelioration of the condition of the wounded in armies in the field, commonly called the Red Cross Convention. Almost all civilized powers have adhered to this convention, and the observance of its provisions is considered a test of civilization. Agreements and declarations have also been made as to the nature of the weapons that may be used in war, and as to the treatment of prisoners of war. In this relation we should specify the declaration of St. Petersburg of 1868, which was framed by an international military commission. Far more extensive, covering almost the whole field of the laws of war on land, is the project of declaration of the Brussels Conference of 1874, which, though the powers represented in the conference failed afterward to make it binding, forms the basis not only of the "Manual" formulated by the Institute of International Law in 1880, and of the plan of convention adopted by the Spanish-Portuguese-Latin-American Military Congress at Madrid in 1892, but also of The Hague Conference rules concerning the laws and usages of war.

Notice should also be taken, as contributions to the development of international law, of the efforts made in the 19th century, outside international conferences, to codify various branches of international law, and especially the laws of war. In this particular the 19th century should not withhold its tribute to the 17th, which, even though its earlier wars were distinguished by

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barbarities, may yet claim as its own Gustavus Adolphus and his humane code. Nevertheless we find in the recent acts of various governments a marked advance toward a more comprehensive system. The publication by the United States in 1863 of instructions for the government of armies in the field set an example which has had a stimulating effect. In July 1870, ample instructions were issued by the French government to its naval officers. Russia in 1877, during the conflict with Turkey, issued to her soldiers a catechism founded on the project of the Brussels Conference, besides prescribing liberal rules for the treatment of prisoners of war. In 1894, after the outbreak of the war with China, Japan promulgated a comprehensive prize law, based on the works of jurists, the conclusions of the Institute of International Law in 1882, and the French naval instructions of 1870, and setting the salutary example of abolishing the interest of the individual captor in the prize. In the war between the United States and Spain, each belligerent issued systematic instructions for the government of its army and navy, and the secretary of the navy of the United States has since prescribed, with the President's approval, for the use of that branch of the service, a naval war code, which purports to embody the laws and usages of war at sea.

In the recent development of international law, much influence has no doubt been exerted by unofficial societies, the activity of which specially marked the second half of the 19th century. In the case of the Red Cross Convention, the original impulse proceeded from such an association. The Institute of International Law (*Institut de Droit International*), and the International Law Association, formerly known as the Association for the Reform and Codification of the Law of Nations, are leading examples of societies, unofficial in constitution but international in membership, which are devoted to legal progress.

Besides improving the general rules of law, nations have during the past 100 years made great progress in securing by cooperation common interests, the attainment of which can be assured only by special agreements. The tendency toward cooperation may be seen in the treaties, of which the convention signed at Brussels 2 July 1890, may be mentioned as the leading example, made for the purpose of putting an end to the African slave trade. It may also be observed in the adoption, as the result of the Marine Conference at Washington, in 1889-90, of uniform rules of navigation.

In 1883 a number of powers of Europe and America entered into an international union for the protection of industrial property, and various governments which were not among the original parties have since adhered to it. In the following year a convention was made between 26 states for the protection of submarine cables outside territorial waters. Only two years later, on 9 Sept. 1886, a treaty was concluded at Berne for the protection of property in literary and artistic work. To this treaty, commonly called the International Copyright Convention, the United States was not a party; but it may be said that a step toward its acceptance was taken in the act of Congress of 1891, by which foreign authors and artists were for the first time enabled, subject, however, to the limitation of having the type set in the United States, to copyright their

works in the United States as well as at home. One should also mention the various international agreements in recent times for the regulation and protection of fisheries on the high seas.

By the process of national consolidation which specially marks the more recent years, international relations have been profoundly affected. Multitudes of petty states, with diverse interests and claims to distinction, have been absorbed into great national organizations. If international relations have not, in consequence of this absorption, lost any of their seriousness and importance, they have in a sense become more simple, and the possibilities of international cooperation, whether for the improvement of law or the protection of common interests, have increased. But while the situation has thus been simplified, there has also been a significant widening of the circle in which are included the states that acknowledge the obligations and enjoy the advantages of international law. As the law of nations was originally the product of the Christian states of Europe, nations were classified, with reference to its acceptance and rejection, as Christian and non-Christian. With the admission of Turkey, by the Treaty of Paris of 1856, "to participate in the advantages of the public law and concert of Europe," this classification ceased to be accurate. Lately we have witnessed a further enlargement of the circle by the admission of Japan. The admission of those states to the concert of nations does not signify that the standards of international law have been altered or abandoned. On the contrary it denotes a more general acceptance of those standards as the test of advancement in law, in morals, and in civilization. See DIPLOMACY; HAGUE CONFERENCE; NEUTRALITY.

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International Peace Conference. See HAGUE CONFERENCE.

International Workingmen's Association, an organization of the workingmen of all countries for the advancement of the interests of labor and the emancipation of the working classes. It grew out of a visit of French workingmen to the World's Exposition at London in 1862. In 1864 an organization was formed in London, and an 'Address and Provisional Rules' published; the rules provided for a general congress to be held annually and a central council appointed by that congress to sit in London; workingmen's societies were to join the International in their corporate capacity. The principles and policy were not then definitely announced; the first congress held at Geneva in 1866 passed resolutions favoring the limitation of the working day and the abolishing of child labor; at the next congress at Lausanne (1867) socialistic principles were first definitely announced; from this time the influence of Marx and his followers grew in the organization. In 1868 at the Brussels congress the International announced its opposition to war, and favored the general strike; at the Basel congress in 1869 Bakunin and the anarchists were admitted; but they were expelled from the association in 1872 at the congress at The Hague; this same congress transferred the seat of the General Council to New York. The anarchists held a separate congress at Ge-

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neva in 1873. In 1867 the International rendered substantial aid to the strike of the bronze workers in Paris, and the next year to the strike of the Geneva builders; it assisted the English workmen by preventing the importation of underpaid laborers from the Continent in time of strikes. The International was accused of complicity in the Paris Commune, and while the two had no official connection many of the leaders of the Commune were Internationalists, and its principles and aims were defended by the International. In the United States the Socialist Party, a socialist political organization, was affiliated with the International in 1868, and later some individual trades-unions were also affiliated; finally the North American Federation of the International was formed and held its first national congress in 1872; its organization was in local sections of at least ten members, with a Federal Council of nine elected by the annual congress. Shortly after the transfer of the General Council to New York the Internationalists took a prominent part in the eight-hour day demonstration in New York. The formal organization of the International was dissolved in 1875; in Europe the Social Democratic parties of the different countries grew out of it, and in the United States the Socialist-Labor party. The anarchist faction in the United States split into two organizations, the International Workingmen's Association and the International Working People's Association. The International was important in the history of the labor movement as being the first expression of the recognition of the common interests of labor in all countries, and as being the means of spreading widely the knowledge of the principles of the Marxian socialism. Consult: Ely, 'French and German Socialism,' and 'The Labor Movement in America'; Villetard, 'History of the International'; Zacher, 'The Red International.'

Interstate Commerce Commission. See **COMMERCE, INTERSTATE.**

Interstate Commerce Law. See **COMMERCE, INTERSTATE.**

Interval, in music, is the distance or difference of pitch, arithmetically expressed, between any two tones of a given scale. Occidental nations, including America, employ the diatonic scale (see **SCALE**), an octave comprising five tones and seven semitones, named after the first seven letters of the alphabet. The affix of a flat or sharp before a note denotes its quality but does not affect its name, and the eighth note being in unison commences a new octave. Taking the scale in the key of C major, the various intervals are: minor second = E-F or B-C; grave major second = C-D, F-G, A-B; grave minor third = D-F; minor third = E-G, A-C, B-D; major third = C-E, F-A, or G-B; perfect fourth = C-F, D-G, E-A, G-C', or B-E'; acute fourth = A-D'; acute augmented fourth = B-F; grave diminished fifth = B-F'; grave fifth = D-A; perfect fifth = C-G, E-B, F-C', G-D', A-E; minor sixth = E-C', A-F-B-G'; major sixth = C-A, D-B, G-E'; acute major sixth = F-D'; grave minor seventh = D-C', G-F', B-A'; minor seventh = E-D', A-G; seventh = C-B, F-E'; octave = C-C', D-D', etc. By taking various notes of the diatonic scale as starting points, and measuring known intervals from these, we arrive at inter-

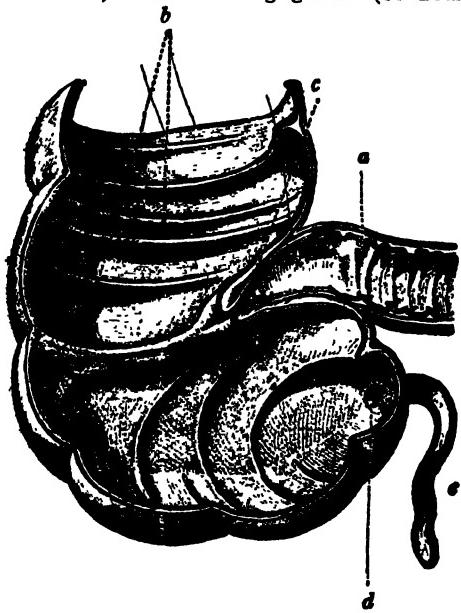
mediate notes of the scale, of which the following are examples: C# minor third below E; D# minor second below E; E $\frac{1}{2}$ minor third above C; A $\frac{1}{2}$ minor sixth above C; B $\frac{1}{2}$ minor seventh above C; B $\frac{1}{2}$ 3 major third above C. The difference of pitch between C and C# or between D and D $\frac{1}{2}$ is called a semitone, and an interval increased or diminished by a semitone is said to be augmented or diminished. This applies especially to the interval of a fourth or a fifth, which with the octave are said to be perfect, because any augmentation or diminution mars their consonance. The major sixth or third may, however, be diminished to a "minor" sixth or third without destroying the consonance; and the term "minor" is also applied to the diminished second or seventh. Intervals confined within the octave are simple, when they exceed it compound; the octave beginning a new series, the ninth is the octave of the second, and so forth.

Intestacy, the legal state of a person dying without having disposed of his property by last will and testament. In Great Britain intestacy does not affect real estate, which is disposed of in accordance with the rule of descent. The effect of intestacy in Great Britain is merely that no directions have been left for the distribution of personal property. The effect of intestacy in the United States varies in accordance with the laws of inheritance fixed by each of them. Intestacy may be complete, as when a valid will is not left by the dead proprietor; or partial, when the extant will only provides for the distribution of part of the property. In these cases the property passes to the heirs or next of kin of the decedent in accordance with the laws of the place where the property is. See **DESCENT; HEIR; INHERITANCE.**

Intestine, Bowel, or Gut, the alimentary tube, in the higher animals limited to that portion between the stomach and the outlet at the anus. The human intestine is divided into the small and large intestine, the two parts varying in structure, movement, and function. The small intestine starts at the pylorus of the stomach, as the duodenum, and the first eight or ten inches are so distinguished. This portion is the widest and most deeply placed of the parts of the small intestine. About three or four inches below the pylorus the ducts of the gall-bladder and pancreas open conjointly into the bowel. The duodenum emerges from the cover of the peritoneum and becomes the jejunum. The remainder of the small intestine constitutes the jejunum (about two fifths) and the ileum. Between these divisions there is little difference, except that the jejunum is more freely movable, occupies the upper left portion of the abdomen more than the lower and right, and has thicker walls. The lumen of the small intestine gradually grows less from the duodenum, where it is two inches and a half in diameter, to little more than an inch where the ileum empties into the large intestine. The ileum is inserted several inches above the actual beginning of the large intestine, so that a blind pouch is formed below the point of juncture; this pouch, called the cæcum, gives off the appendix vermiformis (see **APPENDICITIS**) from its lower and back part. From the cæcum the large bowel passes up to the under surface of the liver as the ascending colon (see **COLON**), thence across the abdomen

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below the lower border of the stomach as the transverse colon, turns down to the iliac fossa as the descending colon, forms a peculiar S-shaped curve, the sigmoid flexure, which passes over the brim of the pelvis, where it is called the rectum (q.v.). The large bowel is about six feet in length. Both bowels have four coats, the mucous coat, the submucous, the muscular, and over most of the bowel an investment of peritoneum forming the serous coat. In the small intestine the mucous membrane is thrown up into permanent folds, each extending over half-way around the inside of the bowel. In this way a large surface is exposed for the absorption of food. Furthermore, the inner surface is covered with finger-like projections called villi, each having a large absorbing vessel in its centre. At the bases of the villi are tubular (of Lieberkühn) and branching glands (of Brun-



Section of the Ileum and Cæcum: *a*, ileum; *b*, cæcum; *c*, ileocecal valve; *d*, opening of the appendix; *e*, appendix.

ner) that dip down into the mucous membrane. Scattered over the surface there are tiny collections of lymphoid tissue, called solitary follicles, and here and there collections of these follicles into groups one to three inches long, called Peyer's patches. It is these spots that are attacked and ulcerated in typhoid fever. The muscular coat consists in an inner layer running around the bowel and an outer longitudinal coat. The large bowel differs from the small in the absence of the folds and villi, and is but slightly movable within the abdomen, being bound down to the abdominal wall posteriorly by the peritoneum. (See PHYSIOLOGY.)

Diseases of the Intestine.—These may be disturbances of the function of the bowels without actual inflammation, or they may be inflammations in different parts and of different kinds; but with inflammations there is necessarily a disturbance of the various functions, and differentiation frequently becomes a matter of difficulty. Diarrhoea and constipation (q.v.)

are symptoms of many different conditions, as are also deficiencies of secretion and absorption. The nervous mechanism of the bowels may be changed, giving rise to abnormal sensations and disturbance of all the functions. True inflammation of the intestines is the most common cause of abnormal action, and therefore is described in detail.

Acute Intestinal Catarrh is an inflammation of the mucous membrane that varies much in its symptomatology with the part of the bowel affected and the causative agent. Among the causes may be mentioned the eating of tainted fruits and other foods; the overeating of any food; overdrinking, particularly of very cold liquids; the ingestion of chemical or mechanical irritants; "catching cold"; and the poisons of the infectious diseases. The bowel is inhabited by numerous forms of micro-organisms, many of which are entirely harmless; but when any of the various agencies mentioned above affect the mucous membrane, the micro-organisms are able to attack the damaged surface. Many forms of bacteria produce particular types of disease when they find such lodgment, because they invade the system with their peculiar products. (See CHOLERA INFANTUM; CHOLERA; DYSENTERY.) But to the growth of bacteria must always be ascribed some of the symptoms in any intestinal catarrh. The attack usually starts in acutely with fever, general bodily discomfort, and abdominal pain. If the inflammation be confined to the upper part of the small intestine there may be constipation; but this is uncommon, and diarrhoea is the rule. Inflammation of the small intestine is spoken of as enteritis, but this is usually associated with more or less inflammation of the large bowel, called colitis (q.v.), although it may occur alone even in its last portion, the rectum. The pain in colitis is apt to be confined to the sides of the abdomen, and when the inflammation is low down there is constant desire to defecate, pain accompanying the act. Passage of mucus alone also indicates an inflammation low down in the rectum. The stools in acute intestinal catarrh vary much with the cause of the trouble; in some observed cases of dysentery the discharges are like rice-water. Treatment of these conditions depends upon the severity and location of the inflammation. The mild cases, with ordinary loose movements, recover without medication with abstinence from food for 24 hours. Castor-oil or small doses of calomel will cleanse the intestine of irritating substances. The more severe cases are kept in bed and allowed small amounts of milk after the first day, and are given small doses of castor-oil or mixtures of bismuth, opium, and other sedative drugs. If the large intestine is found to be involved, irrigation with common salt in water (teaspoonful to the quart) is valuable. Great care must be used in the selection of diet for some time.

Duodenitis occurs associated with acute gastritis (q.v.), and has the same symptoms, except for the presence of jaundice due to the closure of the bile-ducts. The disease runs its course ordinarily in a few weeks without any treatment except rest in bed for a few days, simple diet, and mild cathartics to relieve the constipation. *Chronic intestinal catarrh* results from a severe attack of acute inflammation in which the mucous membrane is left with permanent changes, or from repeated attacks of inflammation. Cases

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of chronic inflammation may occur without previous evidence of acute attacks. The symptoms vary much in kind and intensity, but pain, flatulence, and disturbance of the bowels are usually complained of. There may be pronounced constipation, alternating constipation and diarrhoea, daily unformed movements not distinctly diarrhoeal, or, what is most common, a constant diarrhoea. More or less admixture of mucus in the stools is usually observed. Sooner or later there is apt to be a loss of flesh and strength. When the large bowel is much involved in such a process there is usually a coating of the stools with mucus, or the passage of clear mucus.

In the treatment it is best to rely mainly on carefully regulated life—exercise, baths, fresh air, sufficient rest, avoidance of exposure, and properly selected diet. In diet the objects sought are the regulation of the bowels and the avoidance of irritation. When there is diarrhoea it is wise to avoid fruits, salads, cabbage, coarse-fibred breads, sugars, honey, pastry, sour and sweet wines, and carbonic beverages. In cases attended with constipation most of these may be allowed, but sausages, rich dressings, cucumbers, cabbage, and very coarse-fibred breads should be forbidden. Mineral waters are frequently used with success, such springs as Carlsbad and Vichy for the diarrhoeal cases, and such as Marienbad, Hathorn, and Congress for those attended with constipation. Chronic catarrh of the large bowel is treated with small doses of castor-oil and irrigations of the bowel with water, to which may be added antiseptics or astringents.

Intestinal Hemorrhage, or blood passed from the bowel, may be due to piles, tumors, dysentery, colitis, typhoid fever, tuberculosis of the intestinal tract, ulcers of the duodenum, portal obstruction as in cirrhosis of the liver, haemophilia, purpura, and the hemorrhagic forms of the infectious diseases. When blood coming from the stomach or high up in the small intestine is passed by rectum it is changed to a tarry appearance. This is due to the action of the digestive juices and bacteria. The farther down the intestine the blood starts, the brighter red is it found when passed.

Intestinal Obstruction.—This is a term that includes a great variety of conditions in the abdomen having the common feature of obstruction to the passage of the contents along the bowel; and in addition there is in the acute condition some injury to the bowel resulting in special symptoms. Two varieties are differentiated, the acute and the chronic. Acute intestinal obstructions are caused by foreign bodies, gall-stones, and hardened or large collections of faeces in the canal; by contracting scars, or tumors of the wall, twists of the gut (volvulus), intussusceptions (invagination of a portion above into the part below); by adhesions of the peritoneum, causing constricting bands; and by strangulations of portions of the bowel contained in hernia. Besides these causes, from local or general peritonitis there is apt to be a condition of paralysis of a portion of the bowel, giving rise to the same state. The symptoms vary considerably with the cause of the obstruction and the part of the bowel affected, but in general the symptoms are pain—frequently of a colicky sort—constipation, inability to pass gas—with resulting tympanites—vomiting, first from the shock, and later from

reversed peristalsis, until at length the vomitus is bilious and finally even faecal. Because of these symptoms and the injury to the nerves of the intestine resulting in "shock," there is a gradually increasing prostration. Certain features indicating that the obstruction is in the small intestine are early vomiting, the passage of faeces from the lower bowel, and the greater swelling of the centre of the abdomen. Absolute constipation from the first is apt to mean an obstruction low down in the large bowel. The cause of the obstruction may be indicated by the presence of a tumor, or by something in the previous history. Intussusception is the most common cause of the obstruction in children; a tumor may be felt on the outside, or the bowel may be felt in the rectum. Faecal impaction is indicated by a long history of constipation, and rectal examination shows the hardened masses. If intestinal obstruction be not relieved, the patient may die of shock, with gradual exhaustion, from gangrene of the bowel—the blood-supply being usually shut off—and sometimes from peritonitis.

Medical measures for the relief of most forms of the malady are not successful, and temporizing is attended with danger; but rest of the body as a whole, and especially of the intestinal tract, must be absolute. Some authorities advise the use of opium for further quieting the intestine when the diagnosis is certain. Lavage of the stomach is of great value, and large enemas may be curative when the cause of the trouble is intussusception, foreign body, or hardened faeces. Most forms of obstruction require the opening of the abdomen, search for the cause of the obstruction, and attempts at removal. Results depend on the quickness with which operation is undertaken; death may ensue, in spite of the removal of the obstruction, if interference be too long postponed. Chronic intestinal obstruction is caused by about the same conditions as the acute variety. The symptoms include various digestive disturbances, flatulence, constipation, and, when due to malignant growths, the general loss of flesh and strength.

Intestinal Parasites.—Three principal forms of these affect man—tapeworms, roundworms, and pinworms (qq.v.) The list of symptoms attributed to the presence of tapeworms in the human intestine is long and varied, but even loss of nutrition from such a parasite's presence is usually slight. Finding the worms or their eggs in the stools is the only convincing symptom. Treatment of this condition consists first in the preparation of the intestine by light diet for 24 hours before the taenifuge is given and six or eight hours before, allowing a liberal diet of onions, salty herring, and garlic; this rather loosens the worm's hold. Mild purgatives may also be given at this time. Early on the following morning the selected drug is taken, and this may be either male-fern, pomegranate, pumpkin-seed, kousso, or kamala. After about 12 hours a brisk cathartic is taken and the worm is passed. Careful search must be made for the head, for unless it is passed treatment must be started again while the worm is yet weak. Santonin and purgatives effect expulsion of roundworms. In the treatment of pinworms it is customary to take advantage of the fact that the females deposit their eggs in the large intestine and rectum. Santonin

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and cathartics aid in gathering the worms where they may be killed by injections of benzine (20 drops to the pint of water), or by solutions of quinine, though further catharsis may be necessary.

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Inton'ing, the practice of delivering prayers in the recitative form. Intoning differs little from chanting: in the latter case the cadence is more developed, the divisions more rhythmical, and the music in continuous harmony. In intoning the greater part of the prayer is recited on one note, and then sung by several voices in unison, the closing words of the sentence being sung to the proximate notes of the scale and in harmony. The practice of intoning prevails in the Greek, Roman, Anglican, and Lutheran Churches.

Intoxica'tion (literally poisoning, commonly restricted to poisoning by means of alcohol, for a discussion of which latter see ALCOHOLISM). Intoxication in the sense of poisoning may result from poisons having their origin outside of the human body (exogenous poisoning), or from poisons which may be developed within the body itself (endogenous poisoning, or auto-intoxication). Some of the most important problems connected with the infectious diseases concern themselves with the study of the intoxications that result from the formation of toxins by specific bacteria distributed throughout the human body during the course of a disease. From the same point of view many of the most complicated intoxications result from variations in the normal metabolism of the body. Thus in diabetes mellitus (q.v.) there is developed an acid intoxication (diabetic coma), which is due to the inability of the body properly to neutralize by its alkaline salts the excessive amounts of acid produced as a result of the perverted metabolism of this disease. Similarly in Bright's disease a type of intoxication (uræmic poisoning) results from failure of the kidneys to eliminate poisonous products from the human body. It seems not unlikely that a number of diseases such as migraine (sick headache), some forms of epileptic convulsions, different types of skin-eruptions, and some of the mild insanities result from auto-intoxication (q.v.). See POISONING.

Introduced Species. A long catalogue might be made of species of animals and plants which have been transferred by accident or design from their native country or locality to other regions. Sometimes, as in the case of salmon in New Zealand, rabbits in Australia, the European house-sparrow in America and elsewhere, or western fishes in eastern waters, this is done by design; but in the great majority of cases the introduction is accidental and unwelcome, as in the case of the hundred and more species of injurious insects brought into the United States from foreign lands (or the fewer sent abroad from here), and the very many species of "weeds" naturalized on our, and other shores. Such introductions are in the main accidental, the eggs or seeds or grown individuals passing from one region to another in ships or railway trains, or cargoes or discharged ballast; so many plants have been introduced by the latter means that botanists class the group of alien

weeds as "ballast plants." See ACCLIMATIZATION; ZOOGEOGRAPHY.

Intuba'tion, the introduction of a tube into an orifice or an organ, as the larynx, to keep it open. Specially designed tubes for such a purpose are sometimes used in cases of croup, diphtheritic obstruction, etc., as a substitute for tracheotomy.

In'u'lin, a substance resembling starch, but intermediate in nature between that body and the gums. It occurs in the roots of elecampane, dandelion, and certain other plants, and also in the Jerusalem artichoke and the common potato. When pure it is a tasteless white powder consisting of spherical particles. Its chemical formula is probably a multiple of $C_{10}H_{10}O_5$, though $C_7H_{12}O_2$ has been suggested. It is insoluble in alcohol, and but slightly soluble in cold water, although it is very hygroscopic. It dissolves freely in hot water. It melts at 320° F., becoming thereby converted into a different substance known as "pyro-inulin." It is not fermentable, and does not reduce Fehling's solution. Iodine renders it brown or yellow.

Invasion, the entry into a country by a public enemy. As early as 1795 Congress provided by law for protection against the invasion of the United States by any foreign nation or Indian tribe. The act made it lawful whenever there should be an invasion, or imminent danger of one, for the President to call out such number of the militia of the State or States convenient to the place of invasion as he might think necessary to repel it. This, strengthened in some respects by amendments, has been in force ever since. An invasion has usually all the elements of war, and the invaders may be dealt with as persons at war with the country invaded, in accordance with usages of warfare without the declaration of war by Congress. The Supreme Court of the United States has decided that a State is invaded when there is a domestic rebellion within its territory, and that the same rules of law may be enforced as in the case of an invasion by external foes. This decision practically abolishes all distinction between invasion and insurrection, and the same rules which furnish a remedy for invasion can be applied in the suppression of an insurrection or local rebellion. In case the State militia is not sufficiently strong, or not easily available, the standing troops of the United States may be ordered out by the President, if indeed it be necessary to call upon the State troops before resorting to the regular troops of the United States. It is not necessary that actual armed violence shall be resorted to in order to constitute insurrection. Any combination of persons too powerful to be suppressed by the ordinary course of judicial proceedings is tantamount to insurrection, and warrants the use of the effective measures provided for by law for its suppression.

Inventions. The progress of the world in its numerous vast industries and arts has been founded, to a very large extent, upon inventions and discoveries and their subsequent development. Under the American patent law and system, inventors all over the world are stimulated to make public their inventions by reason of receiving in exchange a monopoly in the form of a patent on the invention for a

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period of 17 years. The remarkable increase in the number of protected inventions is shown by the records of the United States Patent Office, as follows: At the end of the first year (1790) 3 patents were issued. In the year ending 1902, 27,136 patents were granted. The total number of patents issued from April 1790 to November 1903 was 752,774.

An invention is recognized to be any new or useful mechanical contrivance or article, method, discovery, composition of matter, or system not previously known or used, or any improvement on any known machine, art, method, or system. Below is given in chronological order a list of important inventions beginning with the 16th century, with the title of the invention, the year it was made, the name of the inventor and his nativity:

INVENTIONS	Date	Inventor	Nativity	
Discoveries of Electrical Phenomena... Won the title of "founder of the science of electricity."	{ 1560 1603	William Gilbert	England	
Screw printing-press.	1620	Blaew	Germany	
Spirally grooved rifle barrel.....	1620	Koster	England	
Iron furnaces.....	1621	Lord Dudley	England	
The use of steam.... The first authentic reference in English literature to the use of steam in the arts.	1630	David Ramseye	England	
Bay Psalm Book, first book published in the Colonies.... Barometer	1640		Mass.	
Steam engine, atmospheric pressure	1643	Torricelli	Italy	
Machine for generating electricity.....	1663	Thomas Newcomen	England	
First paper mill in America	1681-6	Otto von Guericke	Germany	
First steam engine with a piston.....	1690	William Rittenhouse	Penna.	
The manufacture of plate glass established.....	1690	Denys Papin	France	
First to discover difference between electric conductors and insulators....	1695		France	
The first practical application of the steam engine.....	1696	Stephen Gray	England	
First newspaper in America "Boston News Letter".....	1702	Thomas Savery	England	
First to produce electric spark.....	1704	John Campbell	Mass.	
Thermometer	1708			
Electrometer, the well known pith ball.....	1716	Dr. J. Wall	England	
Thermometer	1709	Fahrenheit	Danzig	
Printing-press	1718			
Electrical glass plate machine	1725	John Cantor	England	
Stereotyping	1727	Benjamin Franklin	Utd. States	
First to discover that electricity is of two kinds	1733-9	Martin de Planta	France	
Flying shuttle in weaving	1733	William Ged	Scotland	
Rotary 3-color printing-press (Multi-Color)	1743	Cisternay Fay	France	
Electric or Leyden Jar Substitution of coke for coal in melting iron	1745	John Kay	England	
Lightning conductor.....	1750	Abraham Darby	England	
Spinning jenny	1752	Benjamin Franklin	Utd. States	
	1763	James Greaves	England	
Piano forte, played in public in England in	1767	Richard Wright	Ark.	England
Drawing rolls in a spinning machine.....	1769			England
The introduction of the "Hollander" or beating engine for pulping rags in the manufacture of paper	1773	Samuel Cramp-ton		
The mule spinner.....	1774	Jeremiah Wilkinson		England
Cut nails.....	1775	Miller		Utd. States
Circular wood saw.....	1777	Branchard & Magurier		England
Embryo bicycle.....	1779			France
Steam engine, the basis of the modern engine	1782	James Watt		Scotland
Gas balloon	1783	J. E. & J. M. Montgolfier		France
Puddling iron	1783-4	Henry Cort		England
Plow, with cast iron mold board, and wrought and cast iron shares.....	1784	James Small		Scotland
Power loom.....	1785	James Cartwright		England
First steam-boat in the United States.....	1786	John Fitch		Utd. States
Steam road wagon... (First automobile).	1787	Oliver Evans		Utd. States
Grain thrashing machine	1788	Andrew Meikle		England
Uranium discovered.....	1789	Klaproth		Germany
Hobby-horse, forerunner of bicycle.....	1790			England
Rotary steam power printing-press, the first idea of.....	1790	Wm. Nicholson		
Wood planing machine	1791	Samuel Bentham		England
Gas first used as an illuminant	1792	Wm. Murdoch		England
Cotton gin.....	1794	Eli Whitney		Utd. States
Art of Lithography.....	1796	Alois Senefelder		Germany
Machine for making continuous webs of paper.....	1800	Louis Robert		France
Steam coach	1801	Richard Trevithick		England
Wood Mortising Machine	1801	M. J. Brunel		England
Pattern loom	1801	M. J. Jacquard		France
First fire proof safe.....	1801	Richard Scott		England
Steamboat on the Clyde, "Charlotte Dundas"	1802	William Symington		England
First photographic experiments	1802	Wedgewood & Davy		England
Planing machine.....	1803	J. Branch		England
The application of steam to the loom	1803	William Horrocks		England
Steel pen.....	1803	Wise		England
Steam Locomotive on rails	1804	Richard Trevithick		England
Application of twin screw propellers in steam navigation	1804	John Stevens		Utd. States
Process of making malleable iron castings	1804			
First life preserver.....	1805	Lucas		England
	1805	John Edwards		England
Electro-plating	1805	Luigi Brugnelli		Italy
Knitting machine, the latch needle in the Steamboat navigation on the Hudson River	1806	Jeandean		France
Percussion or detonating compound	1807	Robert Fulton		Utd. States
First street gas lighting in England	1807	A. J. Forsyth		Scotland
Band wood saw	1807	F. A. Winsor		England
Barium, strontium and calcium	1808	Newberry		England
Polarization of light from reflection.....	1808	Sir Humphry Davy		England
	1808	E. L. Malus		France

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Voltaic arc.....	1808	Sir Humphry Davy	England	Wood planing machine	1828	William Woodworth	Utd. States
First steamboat to make a trip to sea, the "Phoenix"....	1808	John Stevens S. C. F. Hahne-mann	Utd. States	Tubular locomotive boiler	1828	Séquin	France
Homeopathy introduced	1810	Frederick Koenig	Germany	Prism for polarized light	1828	Nicol	England
Revolving cylinder printing-press	1810	Thornton & Hall	Utd. States	Spinning ring frame	1828	John Thorp	England
Breech-loading shot-gun	1811	J. B. Ritter	Germany	The "Washington" printing press, lever motion and knuckle joint for a screw, number of impressions per hour, 200	1829	Samuel Rust	Utd. States
Storage battery.....	1812	Zamboni		First steam locomotive in United States, "Stourbridge Lion".....	1829		
Dry Pile (prototype of dry battery)....	1812			Double fluid galvanic battery	1829	A. C. Becquerel	France
First practical steam rotary printing press, paper printed on both sides.....	1814	Frederick Koenig	Germany	Magnesium	1829	Adam Bussey	France
First locomotive in Scotland	1814	George Stephenson	England	First portable steam fire engine	1830	Brathwaite & Ericsson	England
First circular wood saw made in this country	1814	Benjamin Cummings	Utd. States	Magneto-electric induction	1831	Michael Faraday	England
Heliography	1814	Jos. N. Niepce	France	Chloroform	1831	G. J. Guthrie	Scotland
Discovery of Cyanogen	1814	Gay Lussac	France	First conception of electric telegraph	1832	Prof. S. F. B. Morse	Utd. States
Kaleidoscope	1814	Sir David Brewster	England	First Magneto-electric machines	1832	Saxton	Utd. States
Miner's safety lamp..	1815	Sir Humphry Davy	England	Rotary electric motor	1832	Wm. Sturgeon	England
Serditz powder.....	1815			Chloral-hydrate	1832	Justus von Liebig	Germany
Dry gas meter.....	1815	S. Clegg	England	Locomotive, "Old Ironsides" built	1832	M. W. Baldwin	Utd. States
Morphine, first organic alkaloid known....	1816	Sertürner	Germany	Link-motion for locomotives	1832	Sir Henry James	England
Knitting machine....	1816	Brunel	England	Adoption of steam whistle for locomotives	1833	George Stephenson	England
"Draisine" bicycle, "Columbian" press, elbowed pulling bar, number of impressions per hour, 50	1816	Baron von Drais	Germany	Reciprocating saw-tooth cutter within double guard fingers for reapers	1833		
Stethoscope	1817	George Clymer Laennec	Utd. States France	"McCormick" reaper	1833	Obed Hussey	Utd. States
Electro - magnetism discovered	1819	H. C. Oersted	Germany	Rotary electric motor	1834	Cyrus H. McCormick	Utd. States
Lathe for turning irregular wood forms	1819	Thomas Blanchard	Utd. States	Carbolic acid discovered	1834	M. H. Jacobi	Russia
The theory of electro-dynamics first propounded	1820	Andre Ampère	France	Horse shoe machine	1834	Runge	Germany
Quinine	1820	Pelletier & Caventon	France	Constant electric battery	1835	H. Burden	Utd. States
Electroscope	1820	Bohnenberg	Germany	Acetylene gas discovered	1836	J. P. Daniell	England
The conversion of the electric current into mechanical motion	1821	Michael Faraday	England	The revolver; a device "for combining a number of long barrels so as to rotate upon a spindle by the act of cocking the hammer."	1836	Edmund Davy	England
Galvanometer	1822	Schweigger	Germany	The screw applied to steam navigation	1836	Samuel Colt	Utd. States
Multi-color printing.....	1822	P. Force	Utd. States	The galvanizing of iron	1841	John Ericsson	Utd. States
Calculating machine.....	1822	Charles Babbage	England	Indicator-telegraph	1837	Henry Craufurd Cooke & Wheatstone	England
Silicon	1823	James Berzelius	Switzerl'd	Photographic carbon printing	1837		
Discovery of thermo-electricity.....	1823	Prof. Seebeck	England	Babbitt metal	1838	Mungo Ponton	France
Liquefaction and solidification of gas.	1823	Michael Faraday	England	Vulcanization of rubber	1839	Isaac Babbit	Utd. States
Water gas, production of.....	1823	Ibbetson	England	The first boat electrically propelled	1839	Charles Goodyear	Utd. States
Portland cement.....	1825	Joseph Aspdin	England	Daguerreotype	1839	Jacobi	Germany
First passenger railway, opened between Stockton and Darlington, England	1825			First to produce a direct photographic positive in the camera by means of highly polished silver surfaced plate exposed to the vapors of iodine and subsequent development with mercury vapor.			
Electrical spur wheel	1826	Barlow	England	Making photo-prints from paper negatives	1839	Louis Daguerre	France
Bromine	1826	M. Baland	France	(First production of positive proofs from negatives).	1839	Fox Talbot	England
First railroad in United States, near Quincy, Mass....	1826						
The law of galvanic circuits formulated	1827	George S. Ohm	Germany				
Fraction matches....	1827	John Walker	Utd. States				
The reduction of aluminium	1827	Friedrich Wohler	Germany				
Law of electrical resistance	1827	George S. Ohm	Germany				
Improved rotary printing-press London Times, 5,000 impressions per hour	1827	Cowper & Applegarth	England				
Hot air blast for iron furnaces	1828	J. B. Neilson	Scotland				

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Photographic portraits. (Daguerreotype Process)....	1839	Profs. Draper & Morse	Utd. States	Cocaine	1855	Gaedke	Germany
pneumatic Caissons....	1841	M. Triger	France	Process of making steel, blowing air through molten pig-iron	1855	Sir Henry Bessemer	England
Pianoforte automatically played.....	1842	M. Seytre	France	Dryplate photography	1855	Dr. J. M. Tuppenot	France
Steam hammer.....	1842	James Nasmyth	Scotland	Bicycle	1856	Ernest Michaux	Utd. States
Typewriting machine	1843	Charles Thurber	Utd. States	Sleeping car.....	1856	Woodruff Perkins	England
First telegram sent....	1844	Prof. S. F. B. Morse	Utd. States	Aniline dyes	1856		
The use of nitrous oxide gas as an anaesthetic	1844	Dr. Horace Wells	Utd. States	Printing machine for the Blind (contains elements of the present typewriting machine)	1856	Alfred E. Beach	Utd. States
The electric arc light (gas retort carbon in a vacuum)....	1844	Léon Foucault	France	Regenerative furnace	1856	Wm. Siemens	England
Automatic adjustment of electric arc light carbons	1845	Thomas Wright	England	Refining engine in paper pulp making	1856	T. Kingsland	Utd. States
Double cylinder printing-press	1845	R. Hoe & Co.	Utd. States	Coal-oil first sold in the United States..	1857	Messrs. Stout & Hand	Utd. States
Pneumatic tire.....	1845	R. W. Thompson	England	First sea going iron-clad war vessel the "Gloire"	1857		
Sewing machine	1846	Elias Howe	Utd. States	Ground wood pulp...	1858	Henry Voelter	Germany
Suez canal started....	1846	De Lesseps	France	Inclined elevator and platform in the reaper	1858	J. S. Marsh	Utd. States
Ether as an anaesthetic	1846	Dr. Morton	Utd. States	Cable car.....	1858	E. A. Gardner	Utd. States
Artificial limbs.....	1846	Schönbein	Germany	Breech loading ordnance	1858	Wright & Gould	Utd. States
Gun cotton.....	1846	Debain	France	Feed injector for Boilers	1858	Giffard	France
First pianoforte keyboard player	1846	Dr. Simpson	Scotland	Storage or secondary battery	1860	Gaston Planté	France
Chloroform in surgery	1847	Sobrero	Utd. States	Singing telephone	1860	Philip Reis	Germany
Nitro-glycerine	1847	Savage	Utd. States	Ammonia absorption ice machine.....	1860	F. P. E. Carré	France
Time-lock	1847	Richard M. Hoe	Utd. States	Improved stereotyping process	1861	Charles Craske	Utd. States
Hoe's lightning press capable of printing 20,000 impressions per hour.....	1847	A. L. Dennison	Utd. States	Shoe sewing machine	1861	George McKay	Utd. States
Match-making machinery	1848	Chambers	Utd. States	Driven well, a tube with a pointed perforated end driven into the ground...	1861	Col. N. W. Green	Utd. States
Breech gun-lock, interrupted thread.....	1849	Walter Hunt	Utd. States	Passenger elevator...	1861	E. G. Otis	Utd. States
Magazine gun.....	1849	Bourdon	France	Barbed wire fence introduced	1861		
Steam pressure gauge	1849	Sir David Brewster	England	Calcium carbide produced	1862	Frederich Wochler	Germany
Lenticular stereoscope	1849	J. T. Hibbert	Utd. States	Revolving turret for floating battery....	1862	Theodore Timby	Utd. States
Latch needle for knitting machine.....	1849	G. H. Corliss	Utd. States	First iron-clad steam battery, "Monitor"	1862	John Ericsson	Utd. States
"Corliss" Engine.....	1849	Jacob Worms	France	Gatling gun	1862	Dr. R. J. Gatling	Utd. States
Printing-press, curved plates secured to a rotating cylinder...	1849	John Mercer	England	Smokeless gunpowder	1862	J. F. E. Schultze	Prussia
Mercerized cotton.....	1850	Scott Archer	England	Pneumatic pianoforte player (regarded as first to strike keys by pneumatic pockets)	1863	M. Fourneaux	France
Collodion process in photography	1850	Dr. Page	Utd. States	Explosive gelatine...	1864	A. Nobel	France
American machine-made watches.....	1850	W. H. Seymour	Utd. States	Rubber dental plate.	1864	J. A. Cummings	Utd. States
Electric locomotive	1851	Maynard	Utd. States	Automatic grain binding device.....	1864	Jacob Behel	Utd. States
Self-raker for harvesters	1851	J. Gorrie	Utd. States	Process of making fine steel	1865	Martin	Utd. States
Breech loading rifle.....	1851	Rhumkorff	Germany	Antiseptic surgery ..	1865	Sir Joseph Lister	England
Ice-making machine.....	1851	Channing & Farmer	Utd. States	Web-feeding printing press	1865	William Bullock	Utd. States
The Rhumkorff coil	1852	Fox Talbot	England	Automatic shell ejector for revolver...	1865	W. C. Dodge	Utd. States
Fire-alarm telegraph. Reticulated screen for half-tone photographic printing	1852	Watt & Burgess	Utd. States	The Atlantic cable laid	1866	Cyrus W. Field	Utd. States
Soda process of making pulp from wood	1853	Michael Faraday	England	Open-hearth steel process	1866	Siemens-Martin	England
Laws of magnetoelectric induction.....	1853	Michael Faraday	England	Compressed air rock drill	1866	C. Burleigh	Utd. States
Laws of electrostatics	1853	Michael Faraday	Austria	Torpedo	1866	Whitehead	Utd. States
Electrolysis	1853	Gintl		Dynamo electric machine	1866	Wilde	England
Duplex telegraph....	1853	Melhuish	England	Sulphite process for making paper pulp from wood.....	1867	Tilghman	Utd. States
Photographic roll films	1854	Herman	Utd. States	Disappearing gun carriage	1868	Moncrief	England
Diamond rock drill.....	1854	A. B. Wilson	Utd. States	First practical type-writing machine.....	1868	C. L. Sholes	Utd. States
Four motion feed for sewing machines.....	1854	Smith & Wesson	Utd. States	Dynamite	1868	A. Nobel	France
Magazine firearm.....	1854	R. A. Tilghman	Utd. States	Oleomargarine	1868	H. Mege	France
Fat decomposed by water or steam at high temperature, since largely used in soap making....	1855	Lundstrom	Sweden				
Safety matches.....	1855						
Iron-clad floating batteries first used in Crimean war	1855						

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Water heater for steam fire engine..	1868	W. A. Brickell	Utd. States	Rotary disk cultivator	1878	Mallon	Utd. States
Sulky plow.....	1868	B. Slusser	Utd. States	Decided advance in the " Expression " of self-playing pianofortes.....	1878	Gally	Utd. States
Railway air brake.....	1869	George Westinghouse	Utd. States	Automatic grain binder	1879	J. F. Appleby	Utd. States
Tunnel shield (operated by hydraulic power)	1869	Alfred E. Beach	Utd. States	Kathode rays discovered	1879	Sir Wm. Crookes	England
A curved spring tooth harrow	1869	David L. Garver	Utd. States	Steam plow	1879	W. Foy	Utd. States
Dynamo-electric machine	1870	Gramme	France	Magazine rifle	1879	Lee	Utd. States
Celluloid	1870	J. W. & Isaac Hyatt	Utd. States	" Blake " telephone transmitter	1880	Blake	Utd. States
Rebounding gun-lock	1870	L. Hailer	Utd. States	Hammerless gun.....	1880	Greener	Utd. States
The Goodyear welt shoe-sewing machine	1871	Goodyear	Utd. States	Storage battery or accumulator	1880	Camille A. Faure	France
Photographic gelatino bromide emulsion (Basis of present rapid photography). Continuous Web printing-press	1871	R. L. Maddox	England	Typhoid bacillus isolated	1880	Eberth & Koch	Germany
Grain binder	1871	Hoe & Tucker	Utd. States	Pneumonia bacillus isolated	1880	Sternberg	Utd. States
Compressed air rock drill	1871	S. D. Locke	Utd. States	Button hole machine	1881	Reece	Utd. States
Positive motion weaving loom	1872	S. Ingersoll	Utd. States	Improvement in " Expression " of self-playing pianofortes	1882	Schmaele	Utd. States
Theory that light is an electric phenomenon	1872	J. Lyall	Utd. States	Hand photographic camera for plates	1882	Wm. Schmid	Utd. States
Automatic air brake	1872	Clerk Maxwell	England	Tuberculosis bacillus isolated	1882	Robert Koch	Germany
Automatic car coupler	1873	George Westinghouse	Utd. States	Hydrophobia bacillus isolated	1882	Louis Pasteur	France
The photographic platinotype process Prints by this process are permanent.	1873	E. H. Janney	Utd. States	Cholera bacillus isolated	1884	Robert Koch	Germany
Quadruplex telegraph	1873	Willis	England	Diphtheria bacillus isolated	1884	Loeffler	Germany
Twine binder for harvesters	1873	T. A. Edison	Utd. States	Lockjaw bacillus isolated	1884	Nicolaier	France
Gelatino bromide photographic emulsion (Sensitivity to light greatly increased by the application of heat)..	1873	M. L. Gorham	Utd. States	Antipyrene	1884	Kuno	Utd. States
Self-binding reaper..	1873	Charles Bennett	England	Linotype machine	1884	Othmar Mergenthaler	Utd. States
Barbed wire machine	1873	Locke & Wood	Utd. States	The rear-driven chain safety bicycle	1884	George W. Marable	Utd. States
Siphon recorder for submarine telegraphs	1874	Glidden & Vaughan	Utd. States	Chrome tanning of leather	1884	Schultz	Utd. States
Store cash carrier..	1874	Sir William Thompson	England	Process of reducing aluminum	1885	Cowles	England
Illuminating water gas	1875	D. Brown	Utd. States	Gas burner	1885	Carl Weisbach	Germany
Roller flour mills	1875	T. S. C. Lowe	Utd. States	Hydraulic dredge	1885	Bowers	Utd. States
Middlings purifier for flour	1875	F. Wegmann	Utd. States	First electric railway in United States, Hampden and Baltimore, Md.....	1885		
Ice making machine	1875	Geo. T. Smith	Utd. States	Contact device for overhead electric trolley	1885	C. J. Van De poele	Utd. States
Speaking telephone..	1876	R. P. Pictet	Switzerl'd	Graphophone	1886	Bell & Tainter	Utd. States
Electric candle	1876	Graham Bell	Utd. States	Electric welding	1886	Elihu Thompson	Utd. States
(The first step towards the division of the electric current for lighting.)	1876	Paul Jablochko	Russia	Combined harvester and thresher	1886	Matteson	Utd. States
Continuous machine for making tobacco cigarettes	1876	Russell	Utd. States	Band wood saw	1887	D. C. Prescott	Utd. States
Steam feed saw mills	1876	D. C. Prescott	Utd. States	Cyanide process of obtaining gold and silver	1887	Mc Arthur & Forrest	Utd. States
The first Portland cement plant in U. S.	1876			System of polyphase electric currents	1887	Nicola Tesla	Utd. States
Phonograph	1877	T. A. Edison	Coplay, Pa.	I n c a n d e s c e n t g a s l i g h t	1887	Carl A. Von Weisbach	Austria
Gas engine.....	1877	N. A. Otto	Utd. States	The formation of a cone-shaped interwoven mantle of thread coated with a refractory rare earth and rendering the same incandescent by the heat rays of a Bunsen gas burner regardless of how the gas is produced			
Carbon microphone..	1877	T. A. Edison	Utd. States	Process of annealing armor plate	1888	Harvey Eastman & Walker	Utd. States
Telephone transmitter of variable resistance	1877	Emil Berliner	Utd. States	" Kodak " snap-shot camera	1888		Utd. States
Carbon filament for Electric lamp.... (Beginning of the incandescent vacuum electric light.)	1878	T. A. Edison	Utd. States	Constructed to use a continuous sensitized ribbon film			
				Process of making artificial silk	1888	H. DeChardonnet	France
				Hertzian waves or electric wave radiation	1888	Heinrich Hertz	Germany

INVENTORY — INVERSION

INVENTIONS	Date	Inventor	Nativity	INVENTIONS	Date	Inventor	Nativity
First rotary cement kilns in U. S.	1889			The first oil burning steamship built in the United States, "Nevada"	1902		
Nickel steel....	1889	Schneider	Coplay, Pa Utd. States	English Pacific cable, Canada-Australasian	1902		
Process of making aluminum	1889	Chas. M. Hall	Utd. States	American Pacific cable	1903		
Electric plow	1890	W. Stephens	Utd. States				
Improved linotype machine	1890	Othmar Mergenthaler	Utd. States				Utd. States
Bicycles equipped with pneumatic tires	1890						
Krag-Jorgensen magazine rifle	1890	Krag-Jorgensen	Utd. States				
"Coherer" for receiving electric waves	1891	Edouard Branly	England				
Rotary steam turbine	1891	C. A. Parsons	England				
Cement lined paper pulp digester	1891	G. F. Russell	Utd. States				
Round bale cotton press	1891	Brown	Utd. States	Thomas A. Edison	742		
Microphone	1891	Emile Berliner	Utd. States	Francis H. Richards	619		
Power loom	1891	Northrup	Utd. States	Elihu Thompson	444		
Commercial application of Formaldehyde	1892	J. J. A. Trillat	France	Charles E. Scribner	374		
Shoe-last lathe, for different lengths ..	1893	Kimball	Utd. States	Luther C. Crowell	293		
Kinetoscope	1893	T. A. Edison	Utd. States	Edward Weston	280		
Process for making carbوروندum	1893	E. G. Acheson	Utd. States	Rudolph M. Hunter	276		
Calcium carbide produced in electric furnace	1893	Thos. L. Willson	Utd. States	Charles J. Van Depoele (deceased)	245		
Argon, a chemical element	1894	Lord Rayleigh & Sir Wm. Ramsay	England	George Westinghouse	239		
Process for liquefying air	1895	Carl Linde	Germany	Rudolph Eickemeyer (deceased)	171		
Electric locomotive, B. & O. Belt Tunnel	1895	Prof. W. C. Roentgen	Utd. States	Hiram S. Maxim	146		
X-Rays....	1895	Thomas L. Willson	Germany	Philip Diehl	137		
Acetylene gas from calcium carbide ...	1895	G. Marconi	Italy	Hosea W. Libbey	127		
System of wireless telegraphy	1896			Louis K. Johnson	114		
Foundation laid of science of radioactivity, i. e., emanation of penetrating rays from luminescent bodies....	1896	Henri Becquerel	France	Talbot C. Dexter	109		
Use of ultra-violet rays in treating diseases....	1896	Niels R. Finsen	Denmark	James H. Northrup	102		
Nernst electric light....	1897	Walter Nernst	Germany				
Method of rendering a clay compound capable of conducting electricity and thence becoming brilliantly incandescent without a vacuum.							
Radium discovered....	1898	Madame S. Curie	France				
Mercury vapor electric light	1900	Peter Cooper Hewitt	Utd. States				
An artificial light composed strictly of the ultra blue violet rays of the spectrum obtained by passing an electric current through a partial vacuum tube filled with mercury vapor, the latter acting as a conductor. Possesses remarkable actinic power for photographic purposes.							
Air-ship	1901	M. Santos-Dumont	France				
Automobile mower....	1901	Deering Harvester Co.	Utd. States				
The first passenger steam turbine ship, "Edward VII."...	1901	Denny & Brothers	England				

It is interesting to note that between the years 1872 and 1900 there were on what may be termed the honor roll of inventors 39 inventors each of whom had received over 100 patents. A few of the most important were:

Thomas A. Edison	742
Francis H. Richards	619
Elihu Thompson	444
Charles E. Scribner	374
Luther C. Crowell	293
Edward Weston	280
Rudolph M. Hunter	276
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Talbot C. Dexter	109
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In the preparation of the foregoing statistics, credit is given to L H Campbell, of the United States Patent Office, for valuable assistance.

FREDERICK C. BEACH, Ph.B.

Editor 'The Scientific American.'

In'ventory, a written list or schedule of goods, chattels and other personal property of an individual or estate, whether for use in legal proceedings, or for commercial purposes. The term is also employed to designate lists of assets prepared in cases of insolvency and bankruptcy, and lists of property made out by guardians of estates or infants. These inventory lists are usually filed with the court for public examination. After an administrator or other officer of the court files his inventory he becomes personally accountable for the property or goods so listed. See also EXECUTOR.

Inver'sion, a change of order whereby the first becomes last and the last first. (1) In rhetoric, a reversal of the natural order of words for the sake of euphony, emphasis, or the like; also the turning of one's own argument against him by an opponent in discussion. (2) In chemistry, a change in molecular structure which is usually induced by fermentation or by heating with a dilute acid, as in the case of starch, sugar, etc. Thus starch and dextrine are changed into glucose, cane-sugar into invert sugar, and maltose into glucose. (3) In geology, the overturning or folding over of strata by igneous agency, so that the order of their succession seems reversed. (4) In mathematics, the operation of changing the order of the terms, so that the antecedent shall take the place of the consequent and the reverse, in both couplets. Thus, from the proportion $a : b : c : d$, we have, by inversion, $b : a : c : d$. (5) In music, the transposition of certain phrases having a common root. (a) The change of a chord by making one of the inner notes act as a bass note, by which means as many inversions can be made as there are actual notes in the chord, not counting the root, the

INVERTASE—INVOICE

harmony in such inversions remaining the same, though the order of component parts is changed; (b) alteration of intervals by making that which was the upper note the lower, and the reverse, the inversion of an interval within the octave being readily found in the difference between the figure 9 and the interval known; (c) the alteration of a subject produced by inverting the intervals of which it consists.

In'vertase, or In'vertin, an enzyme occurring in many fungi, notably in certain yeasts (for example, the *saccharomyces*), and also in the seed-plants. It transforms cane-sugar into a mixture of dextrose and levulose; this mixture being called "invert-sugar" because it turns the plane of polarized light to the left, while the cane-sugar from which it is obtained turns it to the right. According to some writers, a yeast cannot invert cane-sugar except by secreting invertase; but *Monilia candida* effects the inversion, and yet produces no invertase. In this case the action is probably due to some other enzyme, hitherto unidentified. Invertase probably plays a very important part in vegetable chemistry. Like other enzymes, it can apparently perform an unlimited amount of chemical work, without sensible diminution of its own substance. (See FERMENTATION.) Invertase is most active at a temperature of from 120° to 140° F., and in a slightly acid medium. It has been isolated in the form of a powder.

In'vertebrates, a collective term for the lower divisions or phyla of the animal series, which agree in not having a vertebral column or back-bone, used in contradistinction to the highest group of the animal kingdom, to which the name *Vertebrata* or vertebrate animals is given. In the system of Cuvier the *Invertebrata* were divided into the *Radiata*, *Articulata*, and *Mollusca*. Further study revealed that these names did not distinguish natural groups; and the term *Invertebrata* has no longer any definite significance in classification (q.v.).

In'vestiture, in the feudal law, was the open delivery of a feud by a lord to his vassal, thus, by external proof, affording evidence of property. To use the words of Blackstone, "Investitures, in their original rise, were probably intended to demonstrate, in conquered countries, the actual possession of the lord, and that he did not grant a bare litigious right, but a peaceable and firm possession. At a time when writing was seldom practised, a mere oral gift, at a distance from the spot that was given, was not likely to be long or accurately retained in the memory of by-standers, who were very little interested in the grant." For this reason investiture was performed by the presentation of some symbol to the person invested, as a branch of a tree, etc. In the primitive church, after the election of a bishop, and his consecration, the early Christian emperors claimed a right of confirmation. Charlemagne is said to have introduced this practice, and to have invested the newly consecrated bishop by placing a ring and crozier in his hands. Gratian, indeed (Distinct. 63, cap. Adrianus), directly affirms that Pope Adrian positively conceded to the emperor the power of electing, even to the papacy, in 774; but neither Egihard nor any other contemporary writer mentions this fact.

The custom, however, existed, nor does it

appear to have been objected to or opposed during the lapse of two centuries from his reign. The disorderly state of Italy, which succeeded the death of Charlemagne, frequently interrupted the exercise of this right by the Carlovingians; but even so late as 1047, when the empire had passed to another line, Henry III. received an explicit admission of his prerogative, and repeatedly used it. The investigation in the lesser sees followed as a matter of course. Alexander II. issued a decree against lay investiture in general, which was revived by Gregory VII. (Hildebrand), who, having succeeded in annulling the prerogative of the emperors to nominate or confirm popes, sought to disjoin entirely the ecclesiastical from the civil rule. It was not, however, until the papacy of Calixtus II., in 1122, that the question was terminated, as it appears, materially to the advantage of the holy see. In France, even under the papacy of Hildebrand, the right of investiture does not appear to have been made a subject of open quarrel. In spite of the protests of the holy see, the kings exercised the power, but at length relinquished the presentation of the ring and crozier, and contented themselves with conferring investiture by a written instrument, or orally, upon which they were left in peaceful possession of the power. But in England Paschal II. was engaged in a contest little less fierce than that which he maintained with the emperor. Anselm, the primate, refused to do homage to Henry I. for his see. The king seems to have asserted an unqualified right of vestiture, which the pope, who was appealed to, as unqualifiedly denied. After a protracted struggle, and continued threats of excommunication, the controversy ended in England, as it did afterward in Germany, by compromise. Paschal offered to concede the objections against homage provided Henry would forego the ceremony of investiture. To this he agreed (1107).

Invin'cibles, an Irish secret society of 1882, an off-shoot of the Fenians. One of the objects of the Invincibles was to "remove" or assassinate government officers or others who might incur the displeasures of the association or its leaders. On 6 May 1882 the society succeeded in "removing" Lord Frederick Cavendish, who had just arrived from England as secretary for Ireland, and Thomas A. Burke, the under-secretary, in the Phoenix Park at Dublin. The plot was directed against the latter gentleman, and the former, interfering to protect his friend, shared his fate. On 20 Feb. 1883 20 persons charged with complicity in the Phoenix Park murders were put on trial; on 14 July, Joseph Brady, who had been convicted of actual perpetration of the murder of Mr. Burke, was executed, as were others subsequently. The leading witness, who revealed all the secrets of his fellow conspirators, was James Carey of Dublin. He was shot dead near Natal, on 29 July, by an Irishman, O'Donnell, who was subsequently tried, and executed for his crime.

Invocation of Saints. See SAINTS.

In'vence, a list or bill of goods; a detailed statement of merchandise in stock, or to be shipped. Very frequently an invoice accompanies a shipment of goods along with the bill of lading from the consignor to the consignee.

IO—IODINE AND IODIDES IN MEDICINE

An invoice is a memorandum and is not a document of title nor a contract of sale, and has no value in law other than memoranda.

Io, iō, in Greek mythology, a daughter of Inachus; according to others of Iasus or Peiren. Zeus (Jupiter) fell in love with her. Hera (Juno) perceived the infidelity of her husband, and resolved to be revenged on both. Zeus, to protect Io from the jealousy of Hera, changed her into a beautiful white heifer. Hera was not deceived, and set a gad-fly to torment her, and persecuted her without a moment's rest through the world. The wanderings of Io in this condition were a favorite subject with the poets of ancient Greece. Also, in astronomy (1) the first satellite of Jupiter, discovered by Galileo in 1610. (2) The name of the 85th asteroid, discovered by Peters at Clinton, N. Y., 19 Sept. 1865.

Iodine, iō-din or -din, a non-metallic element, analogous in its general properties to chlorine and bromine. It was discovered by Courtois in 1811, in the mother-liquor of kelp that had been used for the production of sodium carbonate; occurring there in combination with sodium and magnesium. It is still obtained from the ashes of certain seaweeds, but the principal supply is now obtained from "caliche," a crude nitrate of sodium that occurs in immense quantities in northern Chile. In the preparation of the commercially pure nitrate of soda from caliche, the mother liquors, after the removal of the nitrate by crystallization, are found to contain large quantities of iodine, chiefly in the form of iodate of sodium, NaIO_3 ; and it is from this substance that the iodine of commerce is now chiefly prepared. The richest caliche contains about 3.5 pounds of iodine per ton.

In its ordinary form, iodine is a solid substance, melting at 237° F., and boiling at about 380° F. In a vacuum, iodine sublimes without melting. Solid iodine is soft, and dark gray in color, with a metallic lustre. The vapor is violet in color, from which circumstance the element takes its name (Greek, "like a violet"). Chemically, iodine has the symbol I, and an atomic weight of 126.85 for O = 16, or 125.9 for H = 1. Solid iodine has a specific gravity of about 4.95 at ordinary temperatures, and a specific heat of about 0.05412. Its volume increases, on account of thermal expansion, by about 0.00013 of its own value for a rise of temperature of 1° F. At temperatures not far above its boiling point, the vapor of iodine has a specific heat (at constant pressure) of 0.03369; and in this same region of temperature the ratio of its specific heat at constant pressure to the specific heat at constant volume is about 1.294. Iodine shows an important change in its vapor density at high temperatures. Thus, below about $1,200^{\circ}$ F. the vapor has a density about 126 times as great as that of hydrogen under the same conditions of temperature and pressure; but as the temperature rises the density of the vapor, relatively to hydrogen, falls off, until it is only about 68 at $2,700^{\circ}$ F. It is believed that this change in density indicates that the molecules of iodine vapor split in two as the temperature rises; a molecule, just above the boiling point, containing two atoms, while at the higher temperature the molecules are monatomic. Iodine is freely soluble in alcohol,

ether, carbon disulphid, chloroform, and glycerin. It is only slightly soluble in pure water, but dissolves readily in aqueous solutions of the iodides. It is also soluble in benzene, acetic acid, and numerous other organic fluids. Iodine is a non-conductor of electricity.

With hydrogen, iodine forms the important compound HI, known as hydriodic acid. (See HYDRIODIC ACID.) With the metals it forms binary compounds called "iodides," which may also be regarded as salts of hydriodic acid. Of these the most important is potassium iodide, KI, which is largely used in medicine. It is prepared by dissolving iodine in a solution of caustic potash, evaporating to dryness, and igniting. This salt is very soluble, and crystallizes in cubes. The iodides of ammonium, sodium, strontium, and zinc are also used to a more limited extent. Iodoform, a yellow crystalline powder with a peculiar characteristic odor when warmed, is also much used as a dressing in surgery. It has the formula CHI_3 , and is analogous in its chemical structure and deportment to chloroform. Iodoform may be prepared by dissolving iodine in an alcoholic solution of caustic potash, the iodoform that is produced separating out as a precipitate. It is also prepared in Germany, to a certain extent, by the electrolysis of a similar solution. (See LOB, 'Electrolysis and Electrosynthesis of Organic Compounds.') Iodine and its compounds are used to some extent in photography, and to a larger extent in synthetic chemistry, for the preparation of the coal-tar colors (q.v.), and other organic substances.

Iodine forms two important oxy-acids, known respectively as iodic acid, HIO_3 , and periodic acid, $\text{HIO}_4 + 2\text{H}_2\text{O}$. These are analogous, in their chemical deportment, to chloric and perchloric acids.

Free iodine combines with starch to form a remarkable deep blue compound, whose production is a well-known test for the presence, in a given substance, of either starch or free iodine. To detect the presence of iodine in a solution, a few drops of thin, clear starch paste are added to the solution to be tested (which should be cold), and hydrochloric acid is added until the reaction is acid. A couple of drops of a concentrated solution of potassium nitrite are then added, when the dark blue color of iodide of starch will instantly be produced, if iodine is present. This test may readily be modified so as to serve for the detection of starch. The reaction is not given by dextrin, nor by other isomers of starch.

Iodine and Iodides in Medicine. Iodine and the iodides have been used in medicine since the Chinese are supposed to have introduced them, 2000 B.C. or earlier. The exact method of action of the iodides is not clear, but it would seem that iodine, being a normal constituent of the human body, is a very essential element in normal metabolism. It is found in comparatively large quantities in the thyroid gland, which is known to exercise a very important action in the general body-metabolism, and it is probably by means of the stimulation of the general metabolism of the body that the iodides manifest their beneficial action. The iodides are freely absorbed from watery solutions by mucous membranes throughout the body, particularly in the stomach and intes-

IOLA — IONIAN ISLANDS

tine. They are taken up into the blood, pass through the tissues, stimulating the lymph-flow, and are excreted in the urine in the form of salts. Iodine itself possesses a local irritant action. It is soon converted into the iodides when taken internally, and causes similar internal changes.

When the iodides are taken in large doses, or even in small doses for a long time, a form of chronic poisoning known as iodism results. In this the chief symptoms, found in the air-passages, consist of a catarrh, especially of the nose, with profuse watery secretion, sneezing, and sometimes bronchitis. There is usually swelling and irritation of the throat and tonsils, and salivation. Nausea and gastric discomforts are common, and skin-eruptions are frequent. There is usually loss of weight, and if the iodide has been taken for a very long period a condition of cachexia, characterized by a great loss of flesh, weakness, depression, and restlessness, may result. The chief use of the iodides in medicine is in the treatment of syphilis, on which it has a specific effect. It is also very useful in the various joint-pains of a chronic character, usually known as chronic rheumatism. Iodine is valuable in the treatment of those diseases known to result from thyroid insufficiency, notably in myxoedema (q.v.), and in cretinism, its allied form in children. For stimulation of the respiratory and nasal passages, as in chronic bronchitis, asthma, and dry nasal catarrh, the iodides are of great value.

Iola, iō'lā, Kan.—The city of Iola, Allen County, Kan., is located on the left bank of the Neosho River, about 40 miles west of the Missouri line, and about 100 miles south of Kansas City. The town is reached by the Atchison, Topeka & Santa Fé, the Missouri, Kansas & Texas, and the Missouri Pacific railroads.

History.—It was laid out by the Iola Town Company in 1859. A post-office was located there the same year and a small village soon grew up. During the war the town made but little progress. In 1865 it became the county-seat of the county, and grew steadily, although very slowly until 1895, when its population was 1,565. In 1896 natural gas was discovered on the town site, and as soon as it was shown that a large gas field existed in and near the town it began to grow rapidly, the population in 1904 exceeding 11,000. This rapid growth followed the location in and near Iola of nine large zinc smelters, a number of brick factories, two Portland cement plants and other manufacturing enterprises attracted to the place by the cheap fuel which the large field of natural gas supplied.

Churches, etc.—The leading church denominations are the Presbyterian, Methodist Episcopal, Christian, Baptist, Episcopal, Reformed, and Catholic. The city is well supplied with schools, its high school being one of the best in the State. There are two daily papers, the 'Record' and the 'Register.'

Business, Population, etc.—The city is surrounded by a well-settled and prosperous agricultural community, but its chief business is derived from the manufacturing industries already named. The population is almost wholly American, the exceptions being a few Poles and Swedes employed in the manufacturing plants. An electric road connects Iola with a number of suburban towns, aggregating a population of about (1904) 5,000.

CHARLES F. SCOTT.

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Io'na, or Icolmkill, an island on the west coast of Scotland, one of the Inner Hebrides, in the county of Argyle. Iona is about 3 miles long by 1½ miles broad; area, 2,000 acres, of which 600 acres are under cultivation, the remainder being hill pasture, morass, and rock. The island derives its interest and celebrity wholly from its history and its ancient ruins, and especially from its connection with Saint Columba, who took up his residence here after the middle of the 6th century (565). The existing ruins are all, however, of a much more recent date. Forty-eight kings of Scotland, four kings of Ireland and eight kings of Norway are said to have been buried on Iona Island, among them being King Duncan, made famous by Shakespeare. About 1000 the Duke of Argyle conveyed the entire island to the Church of Scotland under certain conditions of preservation and restoration.

Ionia, iō'nī-a, that part of the seaboard of Asia Minor which was inhabited by Ionian Greeks, a beautiful and fertile country opposite the islands of Samos and Chios, which also belonged to it. According to tradition, the Greek colonists came over from Attica about 1050 B.C., and founded 12 towns, which, though mutually independent, formed a confederacy for common purposes. These included Phocæa, Ephesus, Miletus, etc., and latterly Smyrna. Commerce, navigation, and agriculture early rendered them wealthy and flourishing, but the country was made tributary by Croesus, king of Lydia, and later by Cyrus, king of Persia (557 B.C.). With an interval of independence they remained under Persia until this empire was overthrown by Alexander the Great, 334-1 B.C., when they became a part of the Macedonian empire. Ionia, at a later period, became part of the Roman province of Asia. It was afterward totally devastated by the Saracens, so that few vestiges of its ancient civilization remain.

Ionia, Mich., city and county-seat of Ionia County; on the Grand River, and the Detroit, G. H. & M., the Pere M., and the Grand T. R.R.'s; 34 miles east of Grand Rapids. It contains the State house of correction, the State asylum for the dangerous and criminal insane, large railroad repair shops, and manufactories of pottery, furniture, machinery, edged tools, and clothing. The industrial interests are greatly promoted by excellent power furnished by the river. The city has a public high school, library, several daily and weekly periodicals, and an assessed property valuation of about \$2,500,000. Under the revised charter of 1897, the government is administered by a mayor and city council elected annually. Ionia was settled in 1833 and incorporated in 1873. Pop. (1890) 4,482; (1900) 5,209.

Io'ian Islands, a number of islands belonging to the kingdom of Greece, in the Ionian Sea, off the coast of Albania and the western and southern shores of Greece, the most southern, Cerigo, and its dependent islets being off the southeastern extremity of the Morea. The principal islands, seven in number, are, reckoning from north to south, Kerkyra (Corfu), Paxos, Levkas (Santa Maura), Ithaki (Ithaca), Kephallenia (Cephalonia), Zakynthos (Zante), and Kythira (Cerigo). To each of these larger islands a number of smaller, scattered along their respective coasts, are attached, and in-

IONIAN PHILOSOPHY—IOWA

cluded in their several local jurisdictions. Area of the whole, 1,097 square miles. Pop. about 300,000. All these islands belong to the great calcareous formation of Greece. They are extremely mountainous, and do not contain enough arable land to produce the corn required by the population; and were it not for the vine, olive, and currant, all of which they produce, they could support but a small number of inhabitants. The climate is even more temperate than that of the neighboring mainland. Snow often falls in the winter, and lies on the mountains, but rarely on the plains. The staple exports are oil, currants, valonia, wine, soap, and salt. The few manufactures are chiefly textile and ornamental. The religion is that of the Eastern Greek Church, to which four fifths of the population belong. Each island has its own bishop, and at the head of the whole is an exarch or primate. The Ionian Islands, so called from lying in that part of the Mediterranean anciently known as the Mare Ionicum or Ionian Sea, often figure in the ancient history of Greece, but only singly, not collectively. In 1809–10 all the islands were overrun by the British troops except Corfu, which did not come into the hands of the British till it was assigned to them by the Peace of Paris in 1814, and the possession of the British was finally fixed and regulated by another treaty concluded at Paris in 1815. The seven islands were then formed into a republic, under the protectorate of Great Britain. In 1857 a wish was expressed by their representatives for reunion with Greece, and the islands, with the consent of the other European powers, were transferred to the kingdom of Greece in 1864.

Ionian Philosophy, the earliest school of Greek philosophy, a school which attempted to explain the phenomena of nature from the forces and attributes of matter itself. In order to do this the philosophers of this school followed two courses, some assuming a single original substance as the ground of all things, and explaining the development and formation of the phenomenal world by a process of condensation and rarefaction which they conceived as affecting the mode of existence of that substance; while others considered all things as formed by separation and combination out of a permanent and unalterable primitive form of matter. According to the view of the first class of Ionian philosophers, therefore, the original material principle was conceived as itself liable to change, and the changes which take place in it were held to give rise to the forms by which the world is known to us; while according to the view of the second class of Ionian philosophers the original material principle was looked upon as in its own nature and qualities unchangeable, and everything was explained by a change of external relations in space.

Ionian School, the school of philosophy which started from the Ionian city of Miletus. The leader of the school was Thales, who started from a disbelief in the current mythological fables of his day. Thales was born about 636 B.C. He was a man of political activity as well as of deep meditative habits. He was proficient in mathematical knowledge and founded the Ionian school which was principally concerned in an inquiry as to the constitution of the universe. He propounded the axiom that

the basis of all phenomena was water, and perhaps he was just as near the truth as Huxley when he declared that everything came out of what he called, by a question-begging term, protoplasm. The next philosopher of the Ionian school was Anaximenes 529 B.C. He also was a materialistic philosopher and like Liebig believed that the origin and substance of everything was air. Diogenes of Apollonia went farther than his predecessor and taught that the basis of phenomena was mind. The Ionian school found its highest development in Anaximander of Miletus 610 B.C., who taught what has been the profoundest discovery of all philosophy ancient or modern that the basis of being was *τὸ ἀτερπόν*, the Infinite.

Ionian Sea, that part of the Mediterranean communicating with the Gulf of Venice by the Strait of Otranto, and having Greece and part of European Turkey on the east; Sicily and the most southern part of Italy on the west. Its greatest breadth is between Cape Matapan in the Morea, and Cape Passaro in Sicily, which is about 400 miles.

Ion'ic Order. See ARCHITECTURE (*Greece*).

Ioniza'tion. See ELECTROLYSIS; ELECTRON; SOLUTION.

Ios, iōs, an island in the *Ægean Sea*, said to have been the birth-place of Homer. According to the ancients his mother was born here, and the poet's grave was likewise located here.

I O U, a written acknowledgment of debt, usually made in this form:—"To A. B. I O U Ten Dollars.—C. D. May 12, 1891." In Great Britain when the name of the creditor is stated such a document is evidence of a debt of the amount stated due to him by the person whose signature it bears. In the absence of the name of the creditor the document is *prima facie* evidence of such a debt being due to the holder of the document. It is not negotiable. The letters I O U are of course used instead of the words "I owe you," on account of the similarity of sound. The I O U is seldom used in the United States.

Iowa, iō-a ("the Hawkeye State"), a north-central State extending from the Mississippi River to the Missouri River, and occupying three and one sixth degrees of latitude. It is bounded on the north by Minnesota, on the east by Wisconsin and Illinois, on the south by Missouri, and on the west by Nebraska and South Dakota. Area, 56,025 square miles; 550 water; it is 310 miles east and west, and 210 north and south. Capital, Des Moines. Pop. (1900) 2,231,853. It is the sixteenth State in order of admission to the Union.

Topography.—Iowa is a part of the great central plain, and is chiefly undulating prairie, rising in gentle swells from the Mississippi River to a divide running diagonally, from a height of 1,604 feet in the northwest to a slight elevation in the southeast, with a parallel subdivide in the southwest. There are now no swamps and few natural forests. The only rough spots are the sharp bluffs where the rivers have cut their paths through the glacial drift; the only woods, those along the streams,—altogether about 7,000 square miles of woodland, with oak, elm, hickory, black walnut, maple, cottonwood, linden, ash, box-elder, pine,

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cedar, etc. The eastern watershed, two thirds of the whole State, is drained to the Mississippi by a series of streams, nearly all of which are parallel and have a southeastward course. The western part is drained to the Missouri by shorter and swifter rivers, flowing first southwest and then south as the Missouri turns eastward. The chief Mississippi affluents are the Upper Iowa, the Turkey, the Maquoketa, the Wapsipinicon, the Iowa, and the Cedar (the "main" stream, the Iowa,—375 miles, its "tributary," the Cedar, 400 miles, the two forming the second largest interior system of the State and joining not far from the mouth of the Iowa), the Skunk, and lastly the Des Moines with its numerous affluents, far the greatest and commercially the most important as well as the finest scenically, rising in Minnesota and running diagonally across the entire State in a course of 350 miles, with a basin of 14,500 square miles. The State is prolonged by a southeastern corner to include the entire channel of the Des Moines. The northern part of the State has a continuation of the many small, clear, pebbly lakes of Minnesota in glacier-scored pits; some of them—the Walled Lakes—surrounded each by a natural wall of loose stones. The largest are Spirit Lake and the two Okoboji lakes in Dickinson County, and Clear Lake in Cerro Gordo County, all popular summer resorts. West Okoboji, of great depth, lies between wooded hills, and is indented by several picturesque "points" or promontories.

Climate.—The winter climate is somewhat severe, owing to the influence of the great uninterrupted plains to the northwest; but like all this region, the severity is tempered by freedom from excessive moisture. The State is one of the healthiest in the Union, several of the streams in the northeast having rocky channels, and none having the miasmatic bottom-lands found farther south. The dry, pure air of its rolling prairies affords a valued sanatorium for consumptives. The extreme temperatures range from 110° above to 40° below zero; but the average range is from 95° above to 20° below. The average rainfall during the years from 1890 to 1903 inclusive was 31.4 inches—two thirds of it between April-October, and more than half during the critical crop months, May, June, July, and August.

Geology.—No less than five separate sheets of drift cover the State, giving a remarkable variety of productive soil, as well as many different clays for industrial purposes. The watershed shows the inclination to the underlying paleozoic rocks, in lines from northwest to southeast. The oldest formation is Sioux quartzite in the northwestern corner. Cretaceous deposits overlie the older formations through the northwest part generally; along the eastern side from north and south are Cambrian, Silurian, Devonian, and Carboniferous in succession. The most valuable mineral beds are the vast fields of bituminous coal, covering more than one third of the entire area of the State, and turning out in the year ending 30 June 1903, 6,185,734 tons, valued at \$8,016,274; employing 13,102 persons, of whom 9,169 were miners. It is the leading coal State west of the Mississippi except Colorado, and a great factor in all the northwestern industries. Its limestone, the finest grade of building stone, near Marshalltown, Anamosa and other points, is quarried to

the extent of about \$800,000 a year. Its gypsum from the rocky hills in the vicinity of Fort Dodge is the basis of a fast increasing manufacture of stucco, hard-wall plaster, and paint, also clays for pottery, fire and building brick, tile, and terra-cotta. Iowa ranks eighth in the value of its clay products. Considerable mineral water is also exported, that from the Colfax springs being in the lead.

Agriculture.—Iowa is unsurpassed in the quality and extent of cultivated land. It presents mainly a friable black loam on the top, from one to five feet deep; is easily worked, is in the main free from stumps and stones, and requires little or no commercial fertilizers. It has three main varieties, the principal being the alluvial mud of the river bottoms, the glacial drift of the prairies, covering most of the State, a sand and clay loam, and the loess, a rich yellow deposit containing much carbonate of lime, found at great depth on the Missouri slope and along the streams in the central and eastern portions. There is now almost no waste land in the State. In 1900 it presented the unparalleled record of 86.5 per cent improved farm land. A large part of the remaining 13.5 per cent yields income as timber and pasture land. With this fertility and a steady and sufficient rainfall, the State has for many years been first in the Union in value of products derived exclusively from the soil. The total value of its farm products in 1900 was \$365,411,528, of which over a hundred million was fed to its own live stock. Its great crop is corn; it varies, in bushels, from 129,104,930 in 1894 to 383,453,100 in 1900, with an average value of \$100,000,000 to \$150,000,000. A fourth of its surface is covered with cornfields. Its second crop is oats (of which it was second in the United States), with a total in 1900 of 168,364,170 bushels; third, barley, 18,059,060; wheat, 22,769,440; rye, 1,170,970; and buckwheat, 151,120. Its cereals altogether occupy nearly half of its area. It also raises considerable flaxseed. Its hay product is surpassed only by New York; in 1902 it was 5,211,232 tons, most of it used for feeding its own stock. The vegetable crops are also of great importance; in potatoes it was second in 1900, producing 2,662,660 bushels, also 224,622 bushels sweet potatoes, altogether realizing \$3,870,746; other vegetables, \$3,332,039. It has a considerable fruit crop, especially of apples; in 1900 the value of orchard products was \$1,849,767, besides \$878,446 of small fruits and berries. The average of Iowa's chief products during the 13 years, 1890-1902, in bushels, is: Corn, 201,200,750; wheat, 16,130,339; oats, 117,118,483; rye, 1,907,482; barley, 12,503,051; flax, 2,182,950; potatoes, 12,198,347; hay, tons, 5,517,884. Iowa leads all the other States in the value of the implements on its farms, namely, \$57,960,660.

Stock-Raising.—Iowa stands near the top in the value of live stock; \$278,830,096 in 1900; and it is significant that while one State, Texas, surpassed it in number of neat cattle,—9,428,196 to 5,367,630—the difference in values was only as \$163,228,904 to \$142,518,902; the average Iowa animal being worth \$26.55 against the Texan's \$17.31. In dairy cows New York alone takes precedence, and the value of dairy products in 1900 was \$18,819,000. That of poultry and eggs was \$19,508,000. Great care is taken to have the best breeds of stock, and

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this alone accounts for the difference in value of the Iowa and the Texas cattle. The richness of the milk is due largely to the breed. In the number of horses (1,268,016) and swine (9,723,791) Iowa led all the other States in 1900; and from 1850 to the last census there has been a steady increase in the number of swine, cattle, and horses.

Manufactures.—The State's fast-growing population and prosperity and its abundant and almost inexhaustible supply of bituminous coal have, together, within the last decade given a rapid impetus to manufacturing. Small factories have enlarged and many new factories have sprung up. Not a few of these are assuming large proportions. In 1900 Iowa manufactured 7,800 cultivators, 5,000 equalizers, 7,560 harrows, 34,560 hoes, 13,638 plows, 2,021 seeders, 100 drills, 3,720 harvesters, 3,775 hay-carriers, 10,980 dozen hay-forks, 5,800 horse hay-rakes, 79,296 scythes, 58,003 separators, etc., representing a total value of \$1,343,455—a gain of over \$400,000 in a single year. In the same year Iowa's product of metal-working machines was valued at \$273,501. There is but one manufactory of typewriters in Iowa (Des Moines), but it is fast becoming one of the foremost in the country, exporting largely to Great Britain, France, and the colonies. The output of carriages and wagons in 1900 was \$4,087,400; product of paints was \$336,867; chemical industries paid \$70,022 in wages. A curious industry has sprung up in and about Muscatine—the manufacture of pearl buttons from mussel shells found in the beds of streams. Almost unknown, it has grown to huge proportions, and now that the manufacturers have united in the protection of the sources of supply, the future of this industry is assured. The value of its products in 1900 was \$866,538, more than one fourth of which went for wages. The industry is now chiefly confined to the cutting of blanks for the eastern market. Iowa has 702 flouring and grist mills, two with a capacity of 100,000 barrels annually. The output of its mills in bushels is: wheat, 12,521,953; corn, 6,352,045; rye, 458,763; buckwheat, 277,593; barley, 538,740; other grain, 5,859,842. Cedar Rapids, Fort Dodge, and Muscatine have extensive oatmeal mills; the one at Cedar Rapids is said to be the largest in the world. The grand total of food products in 1900 was \$142,000,000. The slaughtering and meat-packing industry represented in 1900 a total product amounting to \$25,695,044. Cheese, butter and condensed-milk factory product in 1900 was \$15,846,077—an increase of nearly 50 per cent in 10 years. The fruit and vegetable canning product in 1900 was \$1,359,958—a gain of over \$800,000 in 10 years. Iowa ranks third in the canning of corn. The starch product in 1900 was \$806,831—a gain of over \$500,000 in 10 years; product of boots and shoes in 1900 was \$786,141, a gain of over \$200,000 in 10 years; product of gloves and mittens in 1900 was \$142,600; product of planing mills in 1900 was \$8,684,566. A fact not generally understood is that there is more timber in Iowa to-day than at any other time in its history. The clay products, which were \$175,165 in 1890, had increased in 10 years to \$2,224,920; to this should be added brick and tile products, which in 1900 aggregated \$1,979,322; also pottery, terra-cotta and fire-clay products, \$192,702. The paper product in 1900 was \$243,776. Dubuque has the

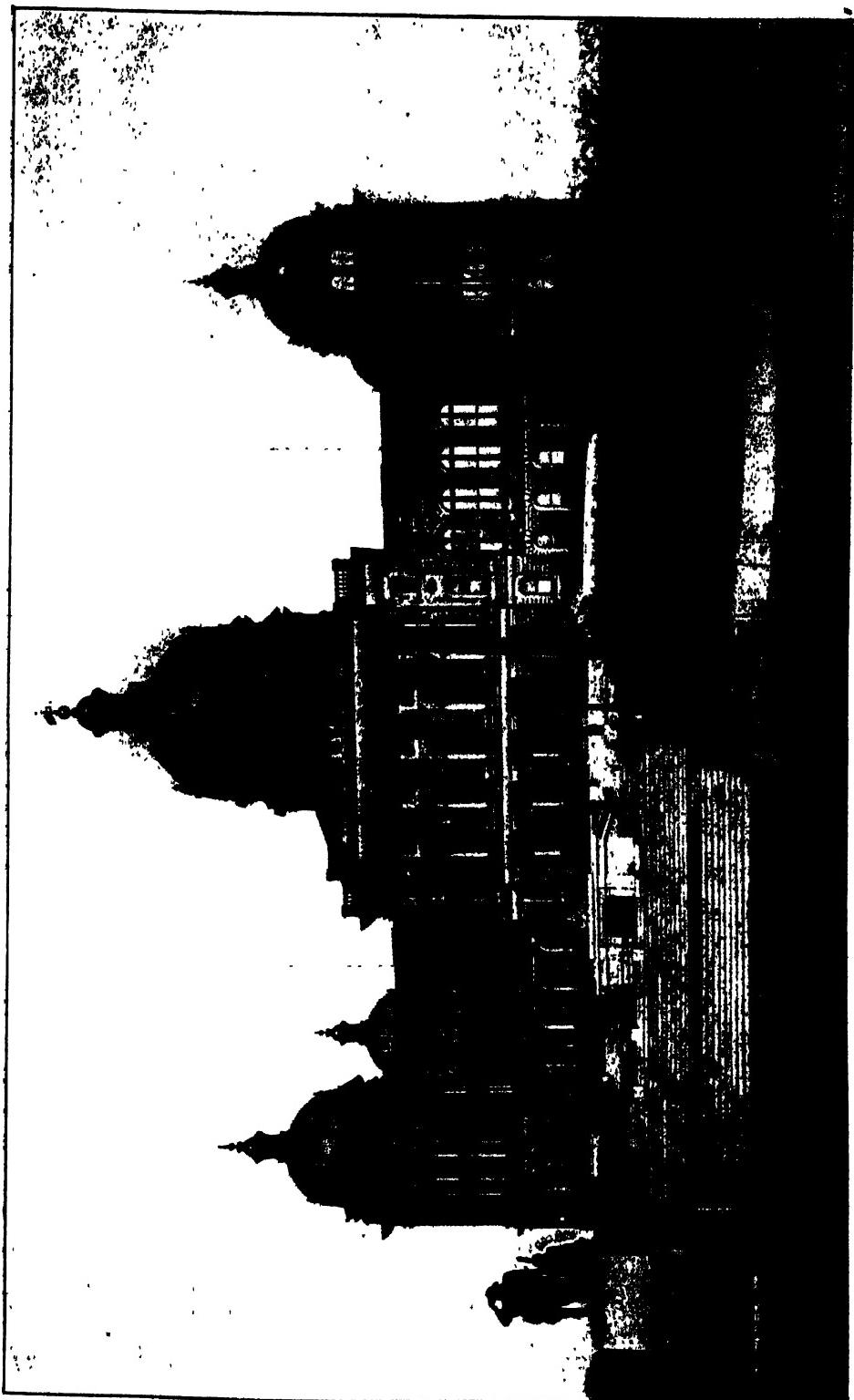
only ship-building plant in the interior. Among the larger cities Des Moines leads in brick-making (over 25,000,000 annually), proprietary medicines, book and job printing and binding, typewriters and hosiery; Sioux City, Ottumwa, Cedar Rapids, and Des Moines in meat-packing; Davenport, Dubuque, Burlington, Des Moines, and Ottumwa in foundries and machine works; Dubuque, Council Bluffs, and Grinnell in carriages; Burlington, Davenport, Des Moines, Dubuque, Ottumwa, Keokuk, and Oskaloosa in cigars; Sioux City, Des Moines, Cedar Rapids, Fort Dodge, Mason City, in flour and other food products; Des Moines, Ottumwa, Grinnell, Newton and Fort Madison in farm and other machinery; the principal river cities in malt products. The total value of manufactured products in 1900 was \$164,617,877—an increase of over 31 per cent in 10 years; the capital represented in 14,819 factories was \$102,733,103—an increase of over 32 per cent; the wages paid the 58,553 employes was \$23,931,680—an increase of over 17 per cent. These figures, showing enormous growth in the last decade, are a surprise to those who regard Iowa as distinctively an agricultural State.

Transportation and Commerce.—Several of the interior rivers are navigable for small boats, the Des Moines for 100 miles, the Missouri for fair-sized steamers its whole length, and the Mississippi for large ones. But the first named are not used to any extent; they have been superseded by railroads; the shifting channel, sandbars and snags of the Missouri make its navigation dangerous and slow. Only the Mississippi remains in practical use. The State, lying in the main path of transcontinental commerce, and originating much well-distributed local traffic, is a vast network of railroads, seven of the great trunk lines crossing it. Every one of the 99 counties has at least one railroad. The farthest distance between railroads at any point in the State is 13.79 miles. In 1903 it had 9,855 miles of road, exclusive of electric lines.

Banking and Insurance.—Iowa has the greatest number of banking institutions of any State in the United States. In August 1903, it had 1,482, divided into 258 national banks, 245 State banks, 350 savings banks, and 561 private banks. The State banks had capital of \$10,445,800; deposits, \$45,268,974.73; surplus, \$1,718,832.41. The savings banks had capital \$11,565,500; deposits, \$87,620,377.34; surplus, \$2,173,462.88. Total capital of all banks in the State, \$53,435,020; total deposits, \$264,803,000. Iowa is rapidly gaining prominence in the insurance world. In life insurance it promises soon to become a formidable competitor with the Eastern States. In 1902 there were 42 life insurance companies having headquarters in the State, and of this number 24 were located in Des Moines, "the Hartford of the West." Of the 42, 10 were "old line" life companies, carrying insurance to the amount of \$36,972,257; 8 were assessment companies, carrying \$209,955,500; 16 were fraternal benefit associations, carrying \$168,418,000. Total of insurance carried by Iowa companies, \$415,345,757.

Education.—Iowa stands second in the literacy of its population; 99.63 per cent of those from 10 to 14 years were, in 1900, able to read and write, although there was no compulsory attendance law prior to 1902. In 1902 it ex-

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pended \$9,556,890 on its schools, there being 18,513 schoolrooms with 22,708 teachers holding certificates. The enrollment of children in the public schools in that year reached 560,173. There has been a liberal increase in the wages of teachers during the school year of 1902 and 1903. About one third of the schools are located in towns and cities and two thirds in the country. Relatively few of the teachers have had normal training. One State normal school and several private normal schools were in operation in 1900. In 1902 the State normal school had 28 professors and 28 other teachers, with 2,065 students. Under a law passed in 1902, 16 private schools have become accredited for the training of teachers under State supervision. For higher education there are about 200 public high schools and a number of private academies. The courses of study pursued are of high standard and generally uniform. The State University, the head of the public school system, is at Iowa City, the former capital, with law, medical, dental, and other colleges, which in 1902 had 48 professors, 111 other teachers, and 1,512 students. There is also a State College of Agriculture and the Mechanic Arts, located at Ames, which in 1902 had 32 professors, 43 other teachers, and 1,480 students. In 1902 a "Memorial University," at present a military academy, was opened at Mason City by the national order of the Sons of Veterans. Connected with certain of the public secondary schools there are 20 training classes for teachers. Among the private schools of the State there are 16 business colleges and 26 academies. Under the auspices of the Roman Catholic Church there are in the State 25 schools for higher education (academies and colleges), with an attendance of 4,040 pupils, 3 normal schools, 167 parish schools, with an attendance of 22,529 pupils. Iowa was one of the first States to pass a township school law. This law has enabled a number of towns to better their school facilities. In 1895 Buffalo Centre township, for example, was organized into a school township, and within four years all the district schools except two were closed and the pupils were transported to a central graded school. The law makes provision for the transportation, at public expense, of children living remote from the central school. The State report for 1901 shows that consolidation has been tried in 28 counties, transportation in 35, and both in 19. Good results were reported in 27 counties, doubtful in 5 counties. Bad roads are the chief obstacle in the doubtful counties, but a vigorous "Good Roads" movement is minimizing this obstacle. Ninety-five per cent of the county superintendents for 1901 favored the plan.

Libraries.—In 1893 there were 83 public libraries in Iowa, as follows: Supported by the State, 12 (volumes, 118,974); college and academic, 24 (volumes, 95,114); association and subscription, 16 (volumes, 81,234); free public, 15 (volumes, 68,809); miscellaneous, 7 (volumes, 46,176); public school, 5 (volumes, 7,850); total, 418,157 volumes. In 1903 the number of libraries had increased to 248, as follows: Supported by State, 22 (volumes, 236,953); college and academic, 36 (volumes, 179,261); association and subscription, 32 (volumes, 52,080); free public, 70 (volumes, 336,305); miscellaneous, 11 (volumes, 89,159);

public school, 77 (volumes, 75,982); total, 969,740 volumes.

Churches.—In the number of church societies in the State the denominations rank as follows: Methodist, Lutheran (three branches), Roman Catholic, Baptist, Christian (Disciples), Presbyterian, Congregationalist, United Brethren, Evangelical Association, Protestant Episcopal, Friends, Reformed, Adventist. There is one Roman Catholic archdiocese, with two dioceses. The non-polygamous Mormons or "Latter-day Saints," and the Amana Colony community of Christian Socialists, have a large and prosperous membership.

Charities and Penal Institutions.—The State charitable institutions are managed by a board of control appointed by the governor with the consent of the senate. There are four insane retreats: at Clarinda, Mt. Pleasant, Independence, and Cherokee; besides four private asylums; a school for the deaf at Council Bluffs; a school for the blind at Vinton; an institution for feeble-minded children at Glenwood; a soldiers' home at Marshalltown; and a home for soldiers' orphans at Davenport. There are State penitentiaries at Anamosa and Fort Madison, both have adopted the graded system; an industrial school for boys at Eldora, and one for girls at Mitchellville. L. S. Coffin has established a home for ex-convicts on his farm near Fort Dodge.

State Government.—The constitution was adopted in 1857. By law, the electors must vote once in 10 years on calling a convention to revise the constitution, which convention the legislature must call if so voted. All amendments must receive a majority vote of both houses at two successive legislatures, and then be passed by popular vote. The Senate has 50 four-year members, the House 100 two-year; legislative sessions are biennial. Bills must have a majority of all members elected to both houses—not merely present. A two-thirds vote overcomes the governor's veto. Executive officials are elected for two years—half in one year and half in the alternates, with the exception of the railway commissioners, who are elected for three; the railroad commission has power to regulate rates, etc. The judiciary consists of a supreme court, with a chief justice who is such by reason of priority of election, and five associate judges, one chosen every year; also 53 district judges in 20 districts, each serving four years. Women may vote only on school questions involving the expenditure of money. All incorporated towns of 2,000 people and over are ranked as cities; all platted but unincorporated towns are villages. In 1902 there was a militia of 2,474 officers and enlisted men. The number of representatives to Congress is 11. In politics the State has been Republican since the organization of the party, except in the years 1890-4, when the advocacy of prohibition drove it into retirement. The prohibitory amendment adopted in 1882 was pronounced unconstitutional by the supreme court of the State, and was succeeded by prohibitory laws which after several years' trial were in turn succeeded by a local option law, under which 54 of the 99 counties were reported in 1903 as wholly free from saloons.

Finances.—The State has no debt except one of \$10,936 to its own school fund, which debt by provision of the constitution is a permanent

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one. It had a balance in the treasury 1 Jan., 1903, of \$926,916.65. Local taxation is limited to 1 per cent of valuation for current expenses, but this may be exceeded for waterworks, sewers, schools, etc. The State as a whole cannot incur a debt greater than \$250,000 except for war purposes, and cannot loan its credit to any person or association; counties and towns cannot run in debt to over 5 per cent of their actual valuation. The average income is about \$3,000,000 a year.

Population and Divisions.—Iowa ranks tenth among the States in population. The population was 43,112 in 1840; (1850), 192,214; (1860), 674,913; (1870), 1,194,020; (1880), 1,624,615; (1890), 1,911,896; (1900), 2,231,853. The original population was part of the great Free-State movement which peopled the central States except Indiana. Of the entire population (1900), 305,920 were foreign-born. Of these 123,162 were from Germany; 72,611 from Scandinavia, or nearly two thirds from the Teutonic nations; besides several thousands from German Austria and Switzerland. From England and English Canada were 35,195; French Canadians 14,168; Ireland 28,321; Holland 9,388. Colored, 12,603. There were 81,845 more males than females. There are no great centres of population. The capital, Des Moines, on the river of the name, is the largest, with 62,139. On the same river to the north is Fort Dodge, an old frontier fort and settlement (12,162), and below it Ottumwa (18,197) and Keokuk (14,641). The Mississippi River business is chiefly represented, from north to south, by Dubuque (36,297—the first settled site in the State), Clinton (22,698), Davenport (35,254), Muscatine (14,073), Burlington (23,201), Fort Madison (9,278), and Keokuk, the "Gate City," at the mouth of the Des Moines. Sioux City (33,111), in the extreme west near the mouth of the Big Sioux, and Council Bluffs (25,802), opposite Omaha, the old terminus of the Union Pacific, represent the Missouri River; Cedar Rapids (25,656) and Waterloo (12,580), the valley of the Cedar River; and Marshalltown (11,544), the valley of the Iowa River.

History.—The territory now included in Iowa was originally inhabited by the Ioway and Illinois tribes of Indians, which were driven out by the Sacs and Foxes. In 1761 the "Ioway" or Iowa tribes were on the east side of the Missouri River and near the headwaters of the Des Moines; but in 1805 they were occupying land on the south side of the Des Moines River. Later they left the vicinity of the Des Moines, some going to the reservation of the Foxes and Sacs (now Oklahoma), others to a reservation in Kansas. The missionary, Father Marquette, and Joliet, the fur trader, were the first white men known to have traveled in this section. In 1673 they visited the tribes of Indians along the Mississippi River, and first landed on Iowa soil near the mouth of the river now known by the name Iowa. In 1788 a party of 10 white men under Julien Dubuque established the first white settlement at the place now occupied by the city of Dubuque. They were attracted to this locality because of the lead deposits in the vicinity. They opened mines, but how successful they were may be conjectured from the fact that after the death of Dubuque, in 1810, his associates abandoned the settlement. All that portion of country drained

by the Mississippi was claimed by France because of the explorations made by Marquette and some of his companions, and because of settlements made by other Frenchmen. France's claim to this territory was ceded by treaty to Spain in 1763, but the country was returned to France in 1800-1. In 1803 all the territory now known as the "Louisiana Purchase" (q.v.) was bought of France by the United States government. The territory now the State of Iowa was part of the Territories of Louisiana in 1805; of Missouri in 1812; of Michigan in 1834; of Wisconsin in 1836. Iowa became an independent territory in 1838, and was admitted as a State in 1846. The Indian claims to lands within the boundaries of the State were purchased by the United States government before its admission as a State. The last purchase was made in 1843. Remnants of the Sacs and Foxes occupy a reservation, 419 acres, in Tama County, and still receive annuities from the government. In 1832 a settlement was made at Fort Madison, an abandoned government post, and soon after Burlington was founded, and in 1830 a settlement was again made at Dubuque. In 1837 the Indians attacked the settlers living near the Okoboji lakes and Spirit lake, in Dickinson County, and about 30 whites were killed and nearly all the houses burned. This action on the part of the Indians retarded for some years the growth of that section of the State. Iowa City was first selected for the Territorial capital (it became the State capital in 1846), but in 1857 the capital was changed to Des Moines. Iowa had in the Federal army during the Civil War 75,839 men, which was about one tenth of her population. Some of this number were in regiments belonging to other States. Consult: Aldrich, 'Annals of Iowa'; State Historical Society publications; Shambaugh, 'Documentary Material Relating to the History of Iowa'; Monette, 'History and Discovery of the Mississippi Valley'; Iowa Geological Survey publications; Shambaugh, 'History of the Constitutions of Iowa' and 'Messages and Proclamations of the Governors of Iowa'; Gue, 'History of Iowa.'

JOHNSON BRIGHAM,
Librarian, Iowa State Library.

Iowa City, Iowa, city and county-seat of Johnson County, on the Iowa River, and the Burlington, C. R. & N., and the Chicago, R. I. & P. R.R.'s; 54 miles west of Davenport. The city is pleasantly built on a succession of plateaus, rising one above another from the river banks, which are here high. The first plateau is laid out as a public promenade, and the third, which is about 30 feet higher than the first, is crowned by a handsome Doric edifice 120 feet long and 60 feet wide, of a beautifully marked stone quarried in the vicinity called "bird's-eye marble." This building was originally intended for the State capitol, but, on the removal of the seat of government to Des Moines, was appropriated to the State University. From 1839 to 1854, this was the seat of the Territorial and State governments. It is the seat of the State University of Iowa, the Iowa State Academy, the State Historical Society and Library, the Homœopathic, Allopathic, and Mercy hospitals. It is the farming trade centre for Johnson, Cedar, and Iowa counties, with an annual trade exceeding \$1,000,000; has excellent power provided by the Iowa River; and has

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manufactories of flour, iron, woolen goods, perfumery, gloves, jewelry, fencing, and linseed oil. The city has electric light and street railroad plants, waterworks on the Holly system, numerous churches, and an assessed property valuation of about \$6,500,000. Besides its manufacturing interests the city has an extensive stock-raising and meat-packing industry. Pop. (1890) 7,016; (1900) 7,987.

Iowa College, a coeducational institution founded in 1847 at Grinnell, Ia.; under the auspices of the Congregational Church. In 1901 it had 33 professors and instructors, 411 students, 27,000 volumes in the library; productive funds, \$470,000; grounds and buildings valued at \$150,000; and an income of \$49,000.

Iowa River, a considerable stream in the State of Iowa rising in Hancock County, near the Minnesota State line and flowing southeast into the Mississippi River, north of Burlington. It is 300 miles in length, and is navigable to Iowa City, 80 miles from its mouth.

Iowa State College of Agriculture and Mechanic Arts, a coeducational institution for technical education at Ames, Iowa. It received a grant of land from Congress under the law of 1862, and was first opened in 1868. Regular courses are offered in agriculture, mechanical engineering, civil engineering, electrical engineering, mining engineering, technology, science as related to industry, and general and domestic science; special shorter courses are given in the fall and winter in dairying, agriculture and mechanics, horticulture and mechanics, and domestic science. The State Agricultural Experiment Station is also allied with the college. The annual income in 1902, including the Federal appropriation, was \$120,000; there were 1,220 students in attendance, and 84 professors and instructors.

Iowa, State University of, an educational institution forming an integral part of the public school system of the State, situated at Iowa City. It was first opened in 1847, receiving control of lands given by the Federal government. (See COLLEGES, LAND GRANT.) The university is controlled by a board of regents of 2 *ex-officio* members and 11 elective members. Its work is organized in the following departments: the college of liberal arts (including the summer session), which offers courses leading to the degrees of A.B., B.S., and Ph.B.; the graduate college; the Iowa school of political and social science, with both undergraduate and graduate courses; the college of law; the college of medicine; the college of homeopathic medicine; and the college of dentistry. The library, which lost 25,000 volumes by fire in 1897, now contains nearly 65,000 volumes; the university issues the following publications: 'Natural History Bulletin'; 'The Transit,' an engineering journal; 'The Law Bulletin'; 'The Bulletin of the Homeopathic Medical College'; 'The University of Iowa Studies in Psychology'; 'The State University of Iowa Studies in Sociology, Economics, Politics and History.' The State appropriates over \$125,000 annually to the university, and the total income amounts to over \$300,000 annually. In 1902 the number of students was 1,512; the number of professors and instructors, 160.

Iowa Wesleyan University, a coeducational institution founded in 1844, at Mount Pleasant, Iowa; under the auspices of the Methodist Episcopal Church. In 1901 it had 20 professors and instructors, and 380 students. There are 5,000 volumes in the library. It has productive funds, \$75,000; grounds and buildings valued at \$150,000; benefactions, \$32,000; and an income of \$14,000.

Iowas, a tribe of American Indians of the Algonquin family. In 1800 the Iowas lived in Minnesota and soon after moved southward. They were called Palinchas, or "Dusty Noses," in their own tongue. Lewis and Clark, the explorers, designate them as the Ayanways, and the early French traders called them the Ajowes. In 1836 they moved to the Wolf River region west of the Mississippi, and in 1861 ceded 16,000 acres of land to the United States. The remnants of the tribe, some 1,000 in number, at present live on reservations in Oklahoma and Kansas. See also INDIANS, AMERICAN; IOWA.

Ip'ecac, or Ipecacuanha, a South American plant of the order *Rubiaceæ* variously called by botanists *Cephaelis ipecacuanha* and *Psychotria ipecacuanha*. The plant, which is found mainly in moist shady forests in Brazil, is a creeping herb or sub-shrub with mostly bare stems, only the extremities producing leaves. The small white blossoms, which are borne in heads with long stalks, are followed by dark purple berries. The rather fleshy more or less divided roots were in medicinal repute among the South American Indians, and gradually found their way into European medicine under the name "ipecacuanha." They have been considered emetic, nauseant, diaphoretic and expectorant, and in large doses are reputed poisonous. They appear in commerce in various grades (gray, brown and red), which are dependent mainly upon the season at which they are gathered, the way they are dried, the age of the plants, etc. The chief supplies are collected during January, February and March by the Indians. Owing to the slow growth of the plant and the low price the roots command, ipecac is not cultivated commercially; it has, however, been successfully grown in various parts of the world. The roots of several other plants are substituted for those of true ipecac, among the best known being those of *Tylophora asthmatica* and *Sarcostemma glaucum* (Venezuelan ipecac), both of the natural order *Asclepiadaceæ*. Other species of *Psychotria* and certain species of *Richardsonia* are similarly but unofficially employed.

Wild or American ipecac (*Gillenia stipulacea*) of the rose family, is a common plant in the southeastern United States and as far north as western New York. It is a perennial herb about three feet tall, bearing paniculate corymbs of white or pale rose colored flowers. It is hardy, of simplest culture and being graceful is frequently planted for ornament in flower borders where the soil is of good quality.

Iphicrates, i-fik'rə-tēz, Athenian commander: b. and d. in the 4th century B.C. Of humble origin, he raised himself to eminence by his courage and talents. In the war of Corinth (393-2 B.C.) he opposed with success Agesilaus, the warlike king of Sparta. He was sent to the Hellespont to act against Anaxibius, but in spite of his victory was unable to prevent the

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conclusion of the shameful Peace of Antalcidas (387 B.C.). In 369 B.C. he was appointed to the command of the troops sent by the Athenians to the assistance of Sparta, on the invasion of Epaminondas, but allowed the Theban general to retreat from the Peloponnesus. In the Social War (357-5) he was one of the commanders of the fleet fitted out by the Athenians for the recovery of Byzantium. Being accused of treachery by one of his colleagues and put on trial he was acquitted; but though he lived to a great age, did not again engage in active service. Iphicrates was the author of some improvements in Greek arms and accoutrements. He was accustomed always to fortify his camp in the field even in a friendly country; "Because," he said, "if, contrary to probability, I should be attacked, I may not be obliged to make the disgraceful excuse that I did not expect it."

Iphigenia, if-i-jē-nī'ā, in Greek legend, a daughter of Agamemnon and Clytemnestra (according to some an illegitimate daughter of Theseus and Helen), who was to have been sacrificed to Artemis (Diana) at the advice of the prophet Calchas, when the goddess, enraged with Agamemnon, detained the Greek fleet in Aulis by a calm. Under pretense that she was to be married to Achilles, Iphigenia was led to the altar. But in the moment when the priest was about to give the death-blow Iphigenia disappeared, and in her stead a beautiful hind was substituted, whose blood gushed out on the altar. Artemis had relented, and conveyed her in a cloud to Tauris, where she became the priestess of the goddess. Conformably with the law of the country, she was obliged to sacrifice every Greek that landed there. While serving as priestess her brother Orestes came to take away the image of Artemis, as he had been advised by an oracle to do, that he might get rid of the madness to which he had been subject since the murder of his mother. Iphigenia having recognized him as her brother, the two contrived a means of escape, and carried off with them the image. The story of Iphigenia was dramatized by Euripides (who composed two plays upon the subject—"Iphigenia in Aulis" and "Iphigenia in Tauris"), and Goethe, and it is also the subject of two operas by Gluck, "Iphigénie en Aulide" (1774); and "Iphigénie en Tauride" (1779).

Ipomœa, ip-ō-mē'ā, a genus of plants, including several hundred species, of the order *Convolvulaceæ*, consisting mostly of twining prostrate herbs, widely distributed in warm regions. The species of most importance is *I. Purga*, which yields the jalap of commerce. Some are cultivated for the beauty of their flowers, and are known to gardeners as convolvuli. *I. purpurea* is the best known garden species. See JALAP.

Ipsambul, ip-sām'boul. See ABU-SIMBEL.

Ips'wich, Mass., town in Essex County, on the Ipswich River near its mouth, and on the Boston & Maine railroad, 27 miles northeast of Boston, and 9 miles south of Newburyport. As Agawam, it was settled in 1633 by John Winthrop and 12 others. The name was changed to Ipswich (after Ipswich, England), in the following year, by resolution of the Massachusetts General Court. As early as 1634 it had a meeting-house, while in 1642 the first free school

in the town was established. Ipswich was among the foremost towns of Massachusetts in resisting the arbitrary taxation introduced under Gov. Andros in 1687, and a number of its citizens suffered punishment in consequence of this action, which foreshadowed the stand to be taken later, by this town and the colonies generally, against similar policies on the part of the British government. Among the distinguished persons who at some time lived at Ipswich were Anne Bradstreet, Nicholas Easton, William Hubbard, John Norton, and others. The town has various industries, among the articles manufactured being grist-mill products, hosiery and underwear, bricks, lumber and boxes, carriages, cabinet-work, soap, isinglass, heels, etc. The Manning High school, the Ipswich Historical Society, and the excellent public library give the town rank and influence in educational and literary affairs. Pop. (1900) 4,658.

Iquique, ē-kē'kā, Chile, a seaport in the province of Tarapacá, till quite recently merely a small fishing village, but now a town of about 34,000 inhabitants. It owes its prosperity to the export of nitrate of soda and borax, the former of which especially is found in great quantities in the pampa of Tamarugal. The annual export of nitrate amounts to about 350,000 tons, and that of borax to about 1,500 tons. Iodine is also exported. The pampa of Tamarugal still contains, it is estimated, about 60,000,000 tons of soda niter. In 1868, and again in 1877, the town was almost entirely destroyed by an earthquake. In 1879 it was bombarded and captured by Chile from Peru; and in 1891 it was much damaged by insurgents.

Iquitos, ē-kē'tōs, a native tribe in Peru, residing at Loreto, on the left bank of the Marañón, about 75 miles above the mouth of the Rio Napo. The settlement has an active trade, valued at \$2,000,000 annually; the imports are exchanged mostly for india rubber. In 1900 they numbered about 12,000.

Trade, i-rā'dē, a Turkish decree or command of the Sultan, directed to his grand vizier, whose duty it is to announce it to the public.

Iran, ē-rān', the name given by the ancient Persians to their native land, in opposition to Aniran (that is, Not Iran), the land of the barbarians, by which term were meant principally the Turco-Tartaric tribes bordering on the north. The Persian rulers of the dynasty of the Sassanidæ call themselves, in inscriptions on monuments and elsewhere, kings of Iran and Aniran. At the present day the name is used in contradistinction to Turan, the name applied to the more depressed regions of Asia inhabited by the Turco-Tartaric tribes, to designate the great table-land of Asia, which has a mean elevation of from 3,500 to 4,000 feet. The central portion of this table-land consists of an extensive salt-desert.

Iranian (i-rā'nī-an) **Languages**, a family of the Indo-European languages, closely allied to the Indian group, and called by some philologists Persian, from the best known member of the family. The two oldest known Iranian languages are the Old Persian and Zend. The former—that of the cuneiform inscriptions of the Achæmenian dynasty, and the language of the Persians proper—has only become known



JOHN IRELAND.

ARCHBISHOP OF ST. PAUL.

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in its chief traits at a comparatively recent date through the deciphering of those inscriptions. The Zend is the language in which the Zend-avesta, the sacred writings of the Parsees, are composed. By the term Middle Iranian languages the Huzvaresh or Pehlevi and the Parsi principally are understood, which are preserved in the commentaries to the Zend-avesta. The latter approaches to the modern Persian. The dialect of the Pehlevi coins, as well as the inscriptions of the time of the Sassanian dynasty, also belong to this section. The most important of the New Iranian languages is the Persian, in which has been produced a very rich and celebrated literature, and which as a cultivated literary language is distinguished from the dialectic varieties of the different regions of Persia which European scholars are as yet only partially acquainted with. The Afghan, or Pashtu, and the dialects of the Kurds, form separate branches of the Iranian family. The isolated Ossetes of the Caucasus also speak an Iranian language. The Armenian is a branch of the same stock, and contains many peculiar elements.

Irapuato, ē-rä-poo-ä'tō, Mexico, district town in the province of Guanajuato, on the Mexican C. railroad, about 30 miles south of the city of Guanajuato, capital of the province. The climate of this region is mild and favorable to the growth of fruits, of which strawberries and other varieties are produced in abundance. Several ancient churches, convents, etc., give the town an interest for visitors. Pop. about 20,000.

Irawadi, ir-a-wä'di, or **Irrawaddy**, one of the great rivers of Southern Asia, traversing Burma in a southerly course. One branch of it rises near the eastern extremity of Assam, another branch rises in East Tibet, the two branches uniting about lat. 26°. It has generally a south course, being deflected west, and its total length has been estimated at 1,200 miles. There are three rocky defiles in which its channel is suddenly contracted, the lowest near Mandalay; but from that point downward to its delta it has generally a breadth of from 1 to 4 miles. About 140 miles from the Indian Ocean, which it enters by numerous mouths, the delta commences. The current of the Irawadi is commonly gentle—even in its upper part being no more than at the rate of two miles an hour; except during the inundations, when it flows so rapidly that no sailing vessels could navigate it but for the assistance of the southwest monsoon. It is navigable from the sea upward for steamers of five feet draft to the Chinese frontier, 900 miles from the sea. Like the Nile, the Irawadi is the main artery of the country through which it flows; the principal population of Burma is established along its banks.

Iredell, James, American jurist: b. Lewes, Sussex, England, 5 Oct. 1751; d. Edenton, N. C., 20 Oct. 1799. He was appointed comptroller of customs at Port Roanoke, now Edenton, where he arrived in 1768, retained this office several years, and meanwhile studied law. He was appointed by the attorney-general his deputy in 1774, and in 1777 was placed by the legislature on the bench of the supreme court, then just organized under the State constitution. In 1787 he was designated by the general assembly sole commissioner to collect and revise the acts of previous assemblies, which were to be considered in force in North Caro-

lina. This collection of the laws, now referred to as "Iredell's Revisal," was published in 1791. In February 1790 he became one of the justices of the Supreme Court of the United States, and held that office till his death. The 'Life and Correspondence' of Iredell was published in 1857.

Iredell, James, American lawyer, son of the preceding: b. Edenton, N. C., 2 Nov. 1788; d. Raleigh, N. C., 13 April 1853. He was graduated at Princeton in 1806, and was bred to the bar. He served for 10 years in the house of commons of his native State, and twice as speaker in a house of which the majority were politically opposed to him. In 1827 he was governor of North Carolina, and from 1828 to 1831 a member of the Senate of the United States. He afterward resumed the practice of his profession at Raleigh, where he was also for many years reporter of the decisions of the supreme court of North Carolina. In 1833 he was appointed by Gov. Swain one of three commissioners to collect and revise all the statutes in force in North Carolina. The result was the work known as the 'Revised Statutes.' He afterward published a 'Treatise on the Law of Executors and Administrators.'

Ireland, ir'länd, Alleyne, American author and lecturer: b. Manchester, England, 19 Jan. 1871. He was educated at the University of Berlin, traveled widely, lectured on tropical colonization at Cornell University in 1899, and in 1900 was appointed lecturer in politics at the University of Chicago, where his subjects were tropical colonization and Chinese foreign relations. In addition to numerous contributions to periodicals, he wrote: 'Georgetown, Demerara' (1897); 'Tropical Colonization' (1899); 'The Anglo-Boer Conflict' (1900); 'China and the Powers' (1901).

Ireland, John, American Roman Catholic prelate: b. Burnchurch, County Kilkenny, Ireland, 11 Sept. 1838. He was educated in the cathedral school at St. Paul, his parents having come to the United States in his childhood. He studied theology in France four years at Meximieux, and four at Var, and was ordained priest in 1861. During the Civil War he was chaplain to the 5th Minnesota regiment; he was afterward appointed rector of the cathedral at St. Paul, and secretary, afterward coadjutor bishop of St. Paul. He succeeded to the see as archbishop of St. Paul in 1888. He took an active part in founding the Roman Catholic University in Washington, organized the first total abstinence society in Minnesota and has been one of the foremost temperance advocates in the American branch of his church. In 1887 he was instrumental in promoting temperance revival in England and Ireland. He has published 'The Church and Modern Society'; etc.

Ireland, Mary E. Haines, American translator and author: b. Calvert, Cecil County, Md., 9 Jan. 1834. In addition to serials and numerous other contributions to the periodical press, she wrote 'What I Told Dorcas' (1895), and 'Grandma Elliot's Farmhouse' (1900); and she also translated from the German a lengthy series of minor works of fiction.

Ireland, William Henry, English literary forger: b. probably London 1777; d. there 17 April 1835. He imposed spurious Shakespearian

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MSS. upon his father, Samuel Ireland, a bookseller and engineer, who was a Shakespeare enthusiast, and also upon other men of letters, and produced two "Shaksperian" plays, "Vortigern" and "Henry II," the former of which was purchased by Sheridan and acted at Drury Lane, but was a complete failure. The criticisms of Malone led to the exposure of the fraud, which was acknowledged by Ireland in 1796. He wrote various novels, poems, etc., besides his "Confessions" (1805), containing an account of his forgeries.

Ireland, the most westerly and smaller of the two principal islands of which the United Kingdom of Great Britain and Ireland is composed, extends from lat. $51^{\circ} 26'$ to $55^{\circ} 21'$ N.; its average width is about one fourth its length; area, 32,583 square miles. It is separated from England by Saint George's Channel and the Irish Sea, and from Scotland by a narrow passage, the North Channel. Ireland is on the continental shelf, or sub-marine plain, which borders the continental land mass of Europe, hence it is physically a part of Europe.

Topography.—The coast line is irregular; from Dundalk Bay to Wexford Harbor on the east there are less indentations than on any other part of the coast; Dublin Bay, an arm of the Irish Sea, is the only indentation of any size on this part of the island. Galway, Sligo and Donegal Bays are the largest on the western coast. The Atlantic currents, which beat against the western coast, have worn away the land in many places, thus causing fiords such as exist on the coasts of other countries subject to similar wave-action. Some of the many islands which fringe the coast have been formed by the washing away or the submergence of the land. The capes, promontories, and peninsulas have been formed largely by submergence. Some of the islands, all small, are Aran, Achill, Clare, and Rathlin. The chief ports are Cork, Dublin, Belfast, Waterford, and Londonderry. There are 14 harbors which will accommodate the largest ocean steamers.

The highlands are chiefly along the coast; the greater part of the interior is a plain. The mountains, more rounded hills than mountains, are short ranges with little or no connection except the several ranges in the southwest. Some of the mountains are Mourne, in County Down, the Wicklow Mountains, Knockmealdown and Galty in the south; Caha, Stack and other ranges in Kerry; Slieve Boughta in Galway, a number of short ranges in the counties of Mayo, Leitrim, Donegal, and Londonderry, and the Slieve Bloom between Queens and Kings counties. The majority of the peaks are less than 3,000 feet in height; Carrantuohill (Carrantual), in Kerry, near the Lakes of Killarney, is 3,404 feet, and Galty Mountains, in Limerick, are 3,015 feet. The plain in the interior is about 500 feet above sea-level.

Hydrography.—The rivers of Ireland, like those of England and Scotland, are small streams. The Shannon, the largest river in the British Isles, has its rise in the northeastern part of the province of Connaught, flows east, south, and west, forming quite a curve before entering the Atlantic Ocean, between the counties of Kerry and Clare. It passes through several lakes, the largest of which are Ree, Allen, and Derg. The estuary at the mouth is about 70

miles long; the whole length of the river is about 250 miles, 130 of which are navigable for large steamers. Its importance for transportation has been increased by the canals Royal and Grand, which connect it with Dublin. In the southwest, in County Kerry, is a short mountain stream called Roughly River, with a long, broad estuary called Kenmare River. The Liffey, which flows into the Irish Sea at Dublin, the Lee which flows into Cork Harbor, the Boyne with its tributary, the Blackwater, are all short streams which have been made famous in history and literature. The Foyle, Erne, Lagan, Moy, Slaney, and others reach the ocean through broad estuaries or bays. Lough Neagh in the northwest is the largest lake of the British Isles. A number of the lakes of Ireland occur along the river courses, but are really basins, and not merely expansions of the rivers. Lakes Corrib, Conn, Foyle, Belfast, Strangford, Carlingford, and others on the coast are estuaries or fiords, but the land-locked mouths entitle them to be called lakes, like Maracaibo in South America. The famous Lakes of Killarney are in County Kerry, in the southwestern part of the island. There is scarcely a place in Ireland that is more than 25 miles distance from water communication with the ocean.

Geology.—A limestone stratum belonging to the basal portion of the Carboniferous system underlies a large part of the interior plain. The upper Carboniferous rock has been destroyed by erosion except in a few places. Silurian rock underlies nearly all of the northern part, but the Cretaceous, Triassic, and Permian formations exist and appear at the surface in several places. Some of the cliffs of the north are of basaltic formation. The Giant's Causeway (q.v.) on the north coast of Antrim is basaltic. Its 40,000 or more, perfectly formed polygonal columns constitute remarkable specimens of this formation. Crystalline rocks form the axis of the mountains of the province of Connaught, and the highlands of Leinster. Old red sandstone and carboniferous limestone are found in the southwestern counties. Marble exists in large quantities in the county of Kilkenny and in parts of the adjacent counties coal of an anthracite variety is found, but not in large quantities; iron-ore exists in nearly every county. Copper of an excellent quality is in the western mountains, also gold and silver in small quantities.

Soil.—The erosion of the limestone rock which has been going on for ages has contributed largely to the fertility of the soil of Ireland. The igneous rocks, the red marls, and other mineral formations, have added to the richness of the soil, and all has been distributed, by the gradual removal of the ice-covering, over a large area of the plain. After deducting the area, about one fifth of the whole, which is covered by bog, mountain, and moorland, there is left a vast extent of arable surface covered with a deep friable loam of remarkable richness. In addition to the decomposed trap and the calcareous matter derived from the limestone, there is a large amount of vegetable mold which forms one of the most important ingredients of the soil. The bogs, useless for tillage, furnish peat for fuel. The Bog of Allen is the largest one in Ireland.

Climate.—The warm moist winds from the Atlantic blowing over Ireland affect its climate more than any other cause except its latitude.

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The mean temperature is from 20° to 30° F. higher than other places in the same latitude on the eastern coast of America or the interior of Europe, and a few degrees higher than places in the same latitude on the west coast of America. The summer temperature is modified by the surrounding waters, being lower by a few degrees than inland places of the same latitude. The moisture brought by the winds from the ocean causes a heavy annual rainfall, and much fog, mist, and general dampness. The low mountains serve to some extent as condensing agents, so that the greatest rainfall is near the coast. The average rainfall on the west and south coasts was, in 1879, 43.56 inches; in 1896, 36.36. The averages for the interior were in 1879, 34.39 inches; in 1896, 34.07 inches.

Vegetation.—The climate and soil are very favorable for vegetation. Its mild temperature and humid atmosphere enable several delicate plants, which usually in the same latitude can be cultivated only in sheltered gardens, to flourish here with vigor in the open air; and frequently forest trees continue to retain their foliage after similar trees have lost their leaves in the warmest parts of England. The conditions would naturally indicate forests, and it seems that in early times, large tracts of magnificent timber were spread over its surface; but the grossest waste and mismanagement have prevailed, trees have almost disappeared except from the parks of the wealthy land-owners, or the "gentry"; and what ought to be among the best is about the worst wooded country in the middle latitudes of Europe. More attention is now being given to the subject of forestry; in 1901 there were 309,741 acres in Ireland under forest, a portion of which was a new growth. During the year, 1,740 acres were planted with trees, mostly fir, spruce, and larch. Grass grows luxuriantly in nearly all parts of the island.

Animals.—The fauna of Ireland consists now of birds and small rodents. Animals once found here and mentioned in the ancient literature, as the deer, bear, wildcat, wolf, beaver, cattle peculiar to the island, and certain birds (including the garefowl), have all disappeared. There are no snakes nor toads in Ireland. Fish are plentiful in the streams and on the coasts.

Fisheries.—The salmon fisheries are very valuable, and are increasing in value every year. With an increased supply of fish, high prices are maintained owing to the improved means of communication from remote districts with the best markets. In spite of this, however, these fisheries are not cultivated to anything like so high a degree as they might be. Still, the number of men engaged in the salmon fisheries in Ireland is over 13,000, the estimated value of the salmon exported being from \$700,000 to \$950,000 annually. The principal sea fisheries of Ireland are those of herring and mackerel. The herring fisheries in the Irish waters are prosecuted chiefly on the east coast by Irish boats from Howth, Arklow, and other places on the Irish coast, and by a fleet of vessels from Cornwall, Scotland, and the Isle of Man. The number of boats engaged in this branch of the sea fishery is much smaller than in Scotland, from which considerable quantities of cured herrings are imported. The total number of vessels engaged in the sea fisheries is now about 6,525, the number of men and boys employed being about 26,200. The native fishermen, it is said, are now success-

fully competing with their rivals, yet the sea fisheries of Ireland on the whole have much declined, as shown by the decrease from 55,630 hands and 13,483 boats employed in 1860, to the figures just given.

Agriculture and Stock-raising.—The chief occupation is agriculture. The richness of the soil, its lightness that makes tillage easy, the large percentage of arable land, the amount of rainfall, the mildness of the climate, all combine to make Ireland an agricultural country. Despite the great extent of moorland-wastes and the large amount of bog-land, few countries raise, in proportion to the area, such a large amount of food products year after year. But with natural advantages above the average, agriculture as a system has not progressed as in many other countries. The wholesale confiscation of estates by the English gave the absentee landlord a large portion of the farm land of Ireland. The new owner usually cared only for his rent and gave little heed to improving the land, and showed no regard for the welfare of the man who tilled the soil. The holders and laborers received no encouragement to improve methods or make progress; on the contrary, they were handicapped in many ways, especially in the 18th century, when the English markets were closed to their products, and Ireland was excluded in a large measure from the commercial advantages given to the British possessions in other parts of the world. The holdings, or farms, originally too small to be occupied by farmers of capital and enterprise, were in many cases subdivided until they were reduced to the smallest patches, on the produce of which a family could barely subsist. One result of this poor policy was that the holders were obliged to raise as much as possible each year, for immediate use, without regard to the ultimate effect of this mode of farming upon the land. Competent authorities say that this over-cropping has had a most deleterious effect upon the land. Yet the soil must have been restored to some extent, by rotation of crops or by the use of fertilizers, for the average produce of the soil per acre, in 1902, was found to have increased over the years 1850 and 1860. In some cases the holdings were enlarged during the last years of the 19th century. Statistics show that a change in the kind of crops has been gradually taking place; a decrease in the acreage under cereals and green crops and an increase in the area under meadow and clover. The following table shows the distribution of the cultivated area, given in acres, the first years of the present century:

YEAR	Green		Clover	
	Cereal, crops	Flax and hay	Flax and hay	Pasture
1900...1,347,189	1,098,377	47,451	1,218,717	11,510,379
1901...1,317,574	1,079,443	55,442	1,233,770	11,522,060
1902...1,306,398	1,070,449	49,746	1,228,498	11,575,592

The number of acres of farm land not under crops, but "resting," was, in 1900, 12,589; in 1901, 10,886; and in 1902, 9,558.

Between 1851 and 1881 the farms of 1 to 15 acres decreased in number by 66,363. The total number of holdings in 1891 was 486,865, or 12,244 less than in 1881. Of these 18,243 (1,304 more than in 1881) did not exceed 1 acre, 55,584 (decrease of 6,197) were from 1 to 5 acres, 139,195 (8,628 decrease) from 5 to 15 acres, 120,472 (2,045 decrease) from 15 to 30 acres, and 139,401 (3,202 increase) above 30 acres. Each province

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shows a decrease in the total number of holdings, but in Munster the number is very small. Between 1841 and 1890 there was a total decrease in holdings "above 1 acre" of 25 per cent.

The Land Act of 1870 greatly improved the conditions of tenure in Ireland. The chief aims of the act were to provide compensation to tenants for arbitrary eviction, and especially for improvements effected by them on their holdings in case of their being disturbed in their possession by the landlords, and to afford facilities to tenants for the purchase of their holdings. The act legalized what is called the Ulster tenant-right custom in all the districts in which it prevailed, and decreed the amount of compensation to be awarded in absence of such custom. In 1881 it was supplemented by a more thorough and comprehensive measure. The benefits conferred on Irish tenants by this act were briefly summarized under the terms "fair rent," "fixity of tenure," and "free sale." By the first of these every tenant who objected to his rent, or the rent the landlord wished to exact, was entitled to have a "fair rent" fixed for him by a court. The rent was to remain unaltered for 15 years, at the end of which period it might be readjusted, and raised or lowered. By the principle of "fixity of tenure" the law recognized that the tenant had a certain right in his holding in virtue of which he was not to be arbitrarily removed from it without compensation, and which enabled him on leaving his farm to obtain the best price he could for yielding up his possession. The "free sale" of this right of tenancy was restricted only in so far as that it must be to one person only (except under agreement with the landlord) that the landlord might object on sufficient grounds to the person purchasing, and that he also had the right of pre-emption. At the expiration of the 15 years the landlord might resume possession of the holding on paying the tenant compensation for improvements effected by him, and also paying him the value of his tenant-right, both being determined by the court should the parties be unable to agree. A tenant who sold his tenant-right on quitting his holding was not to be entitled to compensation for disturbance, or if he had received compensation he was not entitled at that time to sell his tenancy. A tenant holding under the Ulster tenant-right might sell under that or under this system, but not partly under one and partly under the other. The scale of compensation for disturbance of tenancy was fixed as follows: Where the rent was \$146.70 or under, a sum not exceeding 7 years' rent; rent from \$146.70 to \$244.50, not exceeding 5 years' rent; from \$244.50 to \$489, not exceeding 4 years' rent; from \$485 to \$1,467, not exceeding 3 years' rent; from \$1,467 to \$2,445, not exceeding 2 years' rent; above \$2,445, not exceeding 1 year's rent. The act also empowered the land commission to advance loans to tenants not exceeding three fourths of the value of their holdings, to enable them to become proprietors, and such loans were repayable by an annual payment of 5 per cent for 35 years. Provision was also made for assisting emigration. A tenant whose holding, or the aggregate of whose holdings, were valued at not less than \$733.50, was entitled by writing to contract himself out of any of the provisions of this act, or of the act of 1870. Another act passed in 1887 extended the privileges conferred by the act of 1881, and a

third act passed in 1896 went farther in the same direction. The Purchase of Land (Ireland) Act of 1891 supplied the Land Commission with further funds for advances to tenants to enable them to purchase their holdings. But the Land Purchase Act of 14 Aug. 1903, whereby the tenants may buy the farms and become independent of the landlords, is a great beginning toward a readjustment of agricultural conditions. The new law provides that the actual tenants or persons, or persons who have been tenants within 25 years, may purchase all the land they occupy or desire at prices varying according to the condition of the property, to be paid for upon the installment plan, the seller accepting a mortgage for a term of years, the government guaranteeing the payment at the ruling rate of interest. The law is not compulsory; landlord and tenant may arrange matters.

Stock-raising has increased in importance during late years. Statistics show that there are now in Ireland more cattle, in proportion to area, than in any other country of Europe. The following table will show the changes which have taken place since 1900:

YEAR	Horses	Cattle	Sheep	Pigs
1900.....	491,156	4,608,550	4,386,876	1,268,521
1901.....	491,430	4,673,323	4,378,750	1,219,135
1902.....	509,284	4,785,204	4,215,740	1,372,592

England is the principal market for the cattle raised in Ireland. The breeds of horses vary with the locality; ponies are numerous in Connaught; hunters in the north of Leinster; and draft horses in nearly all the counties on the eastern coast. Much good has been effected by co-operative societies. The number of co-operative organizations in 1901 were as follows: 106 agricultural societies, 187 dairy and agricultural societies with 81 auxiliaries, 29 poultry societies, 103 co-operative banks, 46 miscellaneous societies, and 2 federations. The membership of the whole was 51,000.

Manufactures and Trade.—The linen manufacture early took root in Ireland, and still continues to be its most important staple; and in every article, except lace and cambric, competes successfully with all other countries. It has increased in a remarkable manner within the last 40 or 50 years, and Belfast, its centre, has now become the first city of Ireland in population as well as in manufacturing industry. The linen manufacture, indeed, is of importance; a large number of the factories are in Ulster. The cotton manufacture has had a very different history, the number employed in this industry having declined from 4,000 in 1868 to 800. The woolen manufacture appears at the outset to have outstripped that of linen. It had at least made such progress as to alarm the woolen manufacturers of England, who, in a spirit of petty jealousy, petitioned the English parliament for its discouragement, and succeeded. The Irish were prohibited from sending their woolens abroad, and could not even send them into England without paying an oppressive duty. Had the manufacture been suited to the country it might have surmounted all this absurdity and injustice; and, at all events, when these ceased to operate, would have revived. But the woolens of Ireland continue to be of very secondary importance, and indeed the manufacture seems to have much decreased in recent years. The tweed has retained its popularity. The manufacture of Irish poplins (of woolen and silk, or woolen and flax

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or cotton) is very flourishing. The number of textile factories in 1890 was 263, which employed 71,788 persons. There are about 20 mills engaged in paper-making. The brewing of porter and distillation of whiskey form important items in the national production. The making of shirts and other clothing for men is becoming prominent. Ship-building was begun several years ago, and during the last of the 19th century it became quite prominent. The largest ship-building yards are in Belfast, where about 10,000 men and boys are employed. The ships of the White Star line are all built in Belfast. Ship-building is carried on to some extent at Dublin, Londonderry, and Haulbowline. Home work still flourishes; and the Irish hand-made laces and embroideries are still popular.

Commerce.—That of Ireland is not at all proportioned to her natural capabilities, and to the admirable facilities afforded by the excellent harbors situated on her coasts. The laws made by the British government to destroy the commerce of Ireland account in a large measure for the present condition of trade. The most important articles of export find a market in Great Britain. They consist chiefly of grain and flour, live stock, salt and fresh meat, eggs and butter. Manufactured articles, particularly linen, rank next in importance; but as the bulk of such articles is very small in comparison with their value, the trade, or at least the shipping connected with them, holds only a secondary place. The trade with foreign countries is also considerable. The principal imports are colonial produce, woolen and cotton goods, wheat, wool, coal, and salt. Of the shipping employed in this trade only a mere fraction is Irish. Belfast and Dublin are the chief shipping ports. The value of the exports direct from Ireland to foreign ports was about \$4,533,000 in 1883, of imports from foreign parts \$53,166,620; in 1900 they were \$6,560,240 and \$50,072,985, respectively. In 1900 the number of vessels entered from the colonies and foreign parts was 1,048 (1,032,109 tons); and cleared 448 (473,758 tons); entered coastwise 31,069 (6,401,172 tons); cleared 31,026 (6,746,328 tons).

Transportation.—The rivers of Ireland form excellent navigable channels. In several of them, however, when the water was low, the navigation became seriously impeded by rocky shoals. In removing these, or in making artificial cuts for the purpose of avoiding them, vast sums have been expended. Improvements of equal importance have been made by the construction of canals; but since the introduction of railroads, canals have in Ireland, as elsewhere, sunk to a position of secondary importance. The principal canals are the Grand Canal, 165 $\frac{3}{4}$ miles in length; the Royal Canal, 96 $\frac{1}{4}$ miles; the Barrow Navigation, 42 $\frac{1}{4}$ miles; the Newry Navigation, 35 miles; the Lagan Navigation, 26 $\frac{1}{4}$ miles. With the exception of the Barrow Navigation, the Grand Canal, and the Lagan Navigation, the dividends paid by the Irish canals in the possession of public companies are almost nominal. The Royal Canal yields a profitable return, but it is merged in the Midland Great Western Railway. The Grand and Royal canals connect the important systems of the Shannon Navigation, in all 158 miles in length, with Dublin. The railroad system of Ireland has attained a considerable development. The roads are all constructed on a gauge of 5

feet 3 inches, which is compulsory. The average cost of construction, including carrying stock, is about \$80,000 per mile. The principal railroads are the Belfast and Northern Counties Railway, with a total length of 180 miles; the Dublin, Wicklow, and Wexford Railway, 135 miles in length; the Great Southern and Western, 478 miles; the Midland Great Western Railway, 425 miles (including the Dublin and Meath, Great Northern and Western, etc.); the Great Northern of Ireland, 503 miles (including the Dublin and Belfast Junction, 63 miles, and the Ulster Railway, 140 miles); and the Waterford and Limerick Railway, 141 $\frac{1}{4}$ miles, or including the lines of other companies worked by it, 269 miles in length. Few of the Irish railroads pay any dividend at all; but those that do pay represent a large proportion of the capital invested in railroads in Ireland, and some of them are very remunerative concerns. The most profitable of them are a short one connecting Dublin with Kingstown, the Belfast and Northern Counties, and the Ulster Railway. The total length of railroads completed and open for traffic 1 Jan. 1902 was 3,208 miles. The total number of passengers for that year was about 28,000,000, the total amount of minerals and general merchandise carried, about 5,300,000 tons; the total receipts from the carriage of passengers and goods amounted to nearly \$20,000,000.

Public Works.—Large sums have been advanced in loan by the sanction of the imperial parliament under various acts for public works and improvements in Ireland. The Irish board of public works has charge of such grants and their expenditure; the objects to which they are applied include landed improvements and drainage, fishery piers and harbors, roads, bridges, and public buildings, tramways, light railways, and certain lines of inland navigation, and the preservation of ancient monuments. The commissioners have authority to lend for the purpose of any work for which county or borough councils are authorized to borrow. Of \$121,141,190 of loans advanced for purposes that have not yet been fully carried out ("current services"), \$67,655,395 have been repaid, besides interest amounting to \$35,707,115, while the sum of \$7,985,250 has been remitted. The largest item of this expenditure, namely, \$26,196,100, has been spent on the improvement of lands; river drainage and navigation have absorbed some \$14,837,500, while on lunatic asylum buildings there has been spent \$13,101,925; in schemes for the improvement of public health, \$13,451,390; under the Laborers' Acts, \$9,150,940 (to provide employment, etc.); on railways, \$6,000,635; in advances to occupants for improvement of holdings, \$5,355,530; roads and bridges, \$5,041,220. Other sums have been spent on harbors and docks, reclamation of lands, dwellings for the poorer classes, teachers' residences, dispensaries, and in advance to tenants for the purchase of their farms. The recent Land Purchase Bill has made available a large sum of money to be used in aiding tenants in purchase of holdings (1903).

Money, Weights, Measures.—The standard of value is gold. Silver is legal tender up to 40 shillings; bronze up to 12 pence; and farthings only to 6 pence. Bank of England notes are legal tender. The names of the coins used are sovereign, half-sovereign, crown, half-crown, florin, shilling, sixpence, threepence, penny, half-

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penny, and farthing. The standard units are: of weight, the pound, 7,000 grains; of length, the yard; of capacity, the gallon, containing 10 pounds avoirdupois of distilled water at 62° F., the barometer at 30 inches. On these units all other legal weights and measures are based.

The sovereign weighs 123.274 grains, and contains 113.001 grains of fine gold. The shilling weighs 87.27 grains, and contains 80.727 grains of fine silver. Bronze coins consist of a mixture of copper, tin, and zinc. The penny weighs 145.83 grains.

Banks.—The institution known as the Bank of Ireland has a royal charter and unconditional liability. This bank manages, free of charge, all the public debt of Ireland, and, like the Bank of Scotland, it loans money to the British government, for which, since 1865, 3 per cent is paid. In 1902 there were in Ireland nine joint-stock banks with 625 branches, all of which had adopted limited liability. Six of the nine banks were note-issuing.

There are two kinds of savings banks in Ireland: one the trustee savings bank, which has been in existence since the first years of the 19th century; the other, the postal savings bank, which was begun in 1861. The annual amounts which may be deposited by each person are regulated by the Savings Bank Act. According to the act for 1893 the amount which may be deposited in one year by one person is £50, or \$244.50, and not £30, or \$146.70, as was the law under a former act. The amount of stock which may be purchased was raised from £100, or \$489, to £200, or \$978, and the increase in the stock-holding limit was changed from £300, or \$1,407, to £500, or \$2,445. The post-office savings banks are considered more secure than the trustee savings banks, and the deposits in the former are some larger than in the trustee savings banks. The trustee savings banks received in 1897 about \$23,044,180, and in 1902 about \$23,547,910. The postal savings banks received in 1897 about \$10,869,735, and in 1902 about \$12,208,705.

Charities.—The Poor Law, which regulates the system of public charities, is about the same for Ireland as for England and Scotland. It provides for relieving the needy in their own homes or for placing them in charitable institutions. The law is administered by the local government board through boards of guardians elected for the purpose. The number of indoor poor who received assistance for the year 1902 was 43,531; the number of outdoor poor for the same year was 57,813; and those in asylums, 1,427. A large amount of aid is dispersed through private means; but a strong effort is being made to remove the causes, which are about the same in all countries, and which usually result in poverty. Efforts have been made to improve the methods of work, and to foster habits of economy.

Government.—Ireland, by the Act of Union, became an integral part of the United Kingdom, and shares in its legislation by means of 28 representative peers in the House of Lords, and 103 representatives in the House of Commons. The representative peers are elected for life by the whole body of Irish peers. The Lord-Lieutenant, who represents the sovereign, holds his court in the castle of Dublin. Since 1898 great changes have been made in the manner of administering the local government. Previous to that date the chief authority in the county was

the grand jury, and all local affairs pertaining to the government and local laws were attended to by the grand juries and presentment sessions. The act of 1898 provides for a council, elected by the people, for a term of three years. The government of the boroughs, rural and urban districts, is also vested in an elective council. The unincorporated boroughs are governed by commissioners.

The government of the incorporated boroughs is vested in a mayor, aldermen, and council. The large cities are now county boroughs. The chief secretary, the under-secretary, and four commissioners, who are appointed by the Lord-Lieutenant, constitute the local government board, which has supervisory authority over the local council. This board approves or rejects nominations made by the local authority, decides upon salaries, and has the whole local government in charge to a certain extent.

The judiciary of Ireland is similar in many respects to that of England. The highest tribunal is the Supreme Court of Judicature, composed of the High Court of Justice and the Court of Appeal. Other courts are the Court of Bankruptcy, the Land Commissioner's Court, and the High Court of Admiralty. The English municipal law is administered by the courts of Ireland.

Finances.—In addition to local indebtedness Ireland assists in the liquidation of the national debt of the kingdom. The amount which has been apportioned to Ireland, it is claimed, is larger, in proportion to the wealth of the island, than the amount apportioned to England and Wales. The imperial revenue collected in Ireland for the fiscal year ending 31 March 1902 was about as follows: Customs, \$15,500,000; excise, \$15,850,000; estate and duties, \$317,300; stamps, \$15,740,000; income tax, \$5,822,000; post-office, \$3,697,000; telegraphs, \$876,200; crown lands, \$103,400; miscellaneous, \$574,200; making a total, together with the non-tax revenue, of \$46,792,000. The local taxation revenue for the same year was about as follows: Customs, \$74,850; excise, \$635,000; estate and duties, \$995,000. The expenditures for the same year were about as follows: Against exchequer, for the civil government, \$22,200,000; for collection of taxes, \$1,215,000; post-office, \$5,435,000. For local taxation accounts paid the same year, \$5,275,000. The whole makes a grand total of about, for imperial revenue, \$284,125,000; for local revenue, \$1,945,000. The total amount raised for local expenditure was distributed about as follows: For water, gas, electric lights, \$12,270,820; tolls, dues, \$1,913,560; rents, interest \$1,229,225; government contributions, \$7,810,780; loans, \$2,365,800; miscellaneous, \$2,103,685. The chief local expenditures were about as follows: Town and municipal authorities (police, sanitary works, etc.), \$8,025,450; unions, poor relief, \$5,592,420; county, rural sanitary, and road authorities, \$9,591,165; harbor authorities, \$2,422,620.

Population.—Since the census of 1841, when the inhabitants of Ireland numbered fully 8,000,000, the population has almost steadily decreased. In 1846-7 a frightful famine, occasioned by the potato disease, broke out, and was followed by a visitation of fever and cholera. The population was in consequence greatly reduced, and since then emigration has taken the place of

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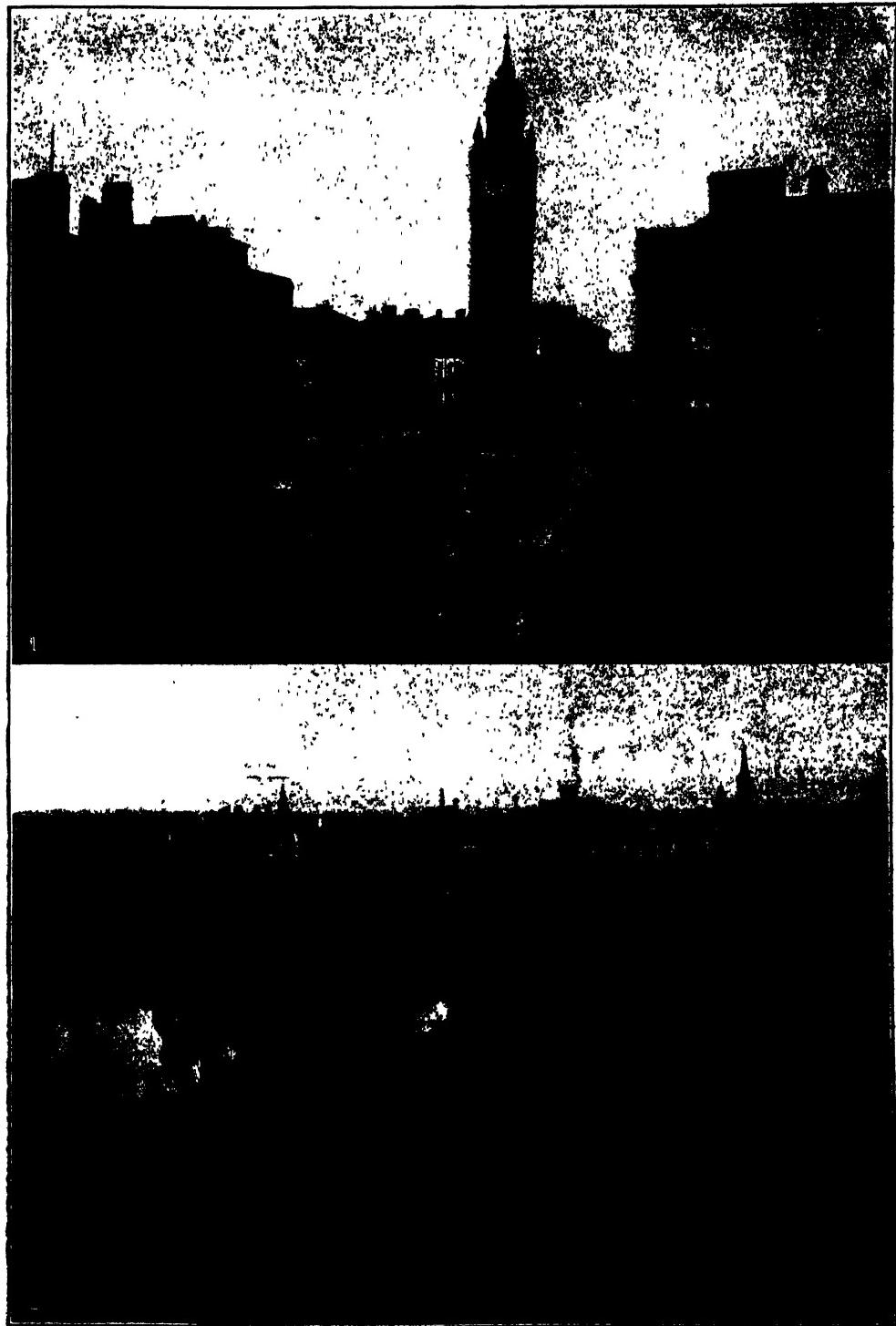
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1. Albert Memorial, Belfast.

2. St. Stephen's Green Park, Dublin.

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famine and disease in reducing it further. The extent of this emigration will be gathered from the following statement of the numbers that left the country between 1851 and 1899:

PROVINCES	Number of Emigrants between May 1, 1851, and Dec. 31, 1898.		
	Males	Females	Total
Leinster	355,104	320,706	675,810
Munster	673,106	640,092	1,313,198
Ulster	590,314	475,761	1,066,075
Connaught	282,532	306,616	589,148
Not specified	61,766	48,902	110,668
Total	1,962,822	1,792,077	3,754,899

From the causes just referred to the total population of Ireland, which might by natural increase have amounted to at least 10,000,000, had dwindled away to 4,425,597 in 1902.

The population by provinces in 1901 was as follows: Leinster, 1,152,829 (150.1 per square mile); Munster, 1,076,188 (112.3 per square mile); Ulster, 1,582,826 (183.8 per square mile); Connaught, 646,932 (94.5 per square mile). In that year the average population per square mile for Ireland was 136.7. In 1901 there were six county boroughs with populations as follows: Dublin, 290,638; Belfast, 349,180; Cork, 76,122; Limerick, 38,151; Londonderry, 39,892; Waterford, 26,769.

Education.—The present difficulties in establishing a public system of education in Ireland had their origin in the times following the efforts to make the people abandon the Roman Catholic Church. As a consequence, the parents refused to patronize the government schools. The laws of the time of William III. and Queen Anne made it a crime for Catholics to teach or to have their children taught by Catholics, or to send them abroad where they would be educated in Catholic schools. The rigid enforcement of these laws resulted in a large proportion of illiteracy among the Roman Catholics, although they had established schools abroad which were attended by those with wealth sufficient to live in a foreign country. (Consult, 'History of Irish Schools and Scholars of the Middle Ages.') The principal educational institutions in Ireland are Dublin University and the three Queen's Colleges. The Queen's Colleges were formerly connected with an examining and degree-conferring body, Queen's University, for which the Royal University of Ireland was substituted in 1882, in pursuance of the University Education (Ireland) Act, 1879; \$100,000 being yearly granted from the surplus funds of the Irish Church (q.v.). The Queen's Colleges, however, are not directly affected by this act. The Royal College of Science for Ireland was established under the authority of the Science and Art Department, London, in August 1867. Its object is to supply a complete course of instruction in science applicable to the industrial arts, and to aid in the instruction of teachers for the local schools of science. There are professors of physics, chemistry, botany, zoology, agriculture, mining, geology, applied mathematics, etc. The course of instruction extends over three years. There are also the General Assembly's Theological College, Belfast; the Magee College,

Londonderry, a Presbyterian college opened in 1865, and embracing in its curriculum literature, science, and theology; the College of St. Columba, near Dublin, founded for the purpose of establishing a system of instruction preparatory to the university.

The Catholic University of Ireland, established in 1854, grants degrees in theology and philosophy, and since 1882 sends its students to the Royal University for examinations for degrees in arts, medicine, law, and engineering. Affiliated with the Catholic University, and now a part of it, are the following colleges: St. Patrick's, Maynooth; University College, Dublin; University College, Blackrock; St. Patrick's, Carlow; Holy Cross, Clonliffe; and School of Medicine, Dublin. There are additional, in different cities and towns, about 40 Roman Catholic colleges and seminaries for men, and a large number of academies or secondary schools for women. There are numerous non-sectarian schools, some of them of royal and private foundation and endowed, but the most prominent are those established since 1831 under the superintendence of the commissioners of national education. These schools are open to the children of parents of all denominations. The pupils are not required to attend any religious exercises or religious instruction of which their parents or guardians disapprove, and opportunity is given to pupils of each religious persuasion to receive separately at appointed times such religious instruction as their parents or guardians may approve of. Of these schools there were 8,670 in operation in 1899, with 785,139 pupils on the rolls. The average daily attendance was small, being only 513,852. In 1892 an act was passed by which a beginning was made of free education, and a modified system of compulsion. In 1878 an act was passed for the promotion of the intermediate secular education of boys and girls in Ireland. By this act about \$5,000,000 from the Irish Church surplus fund was set apart, being invested in commissioners who are to apply the revenue arising from it to the purposes of the act, these being (1) the carrying on of a system of public examinations; (2) the awarding of exhibitions, prizes, and certificates to students; and (3) the payment of results fees to the managers of schools fulfilling certain prescribed conditions. The schools referred to in the act are of a grade superior to the national schools. The subjects of examination are Latin and Greek, modern languages, Celtic, natural science, mathematics, etc. The system of apportion according to results is no longer in use; instead the amounts awarded are based on average attendance.

Considerable attention is given to technical instruction. In all the convent schools the young girls have regular courses in domestic science, and in several trades are taught. The Department of Agriculture and Technical Instruction has an advisory board of technical instruction. In 1901-2 the course of experimental science had been adopted in 152 schools with 6,412 science pupils. The central institutions belonging to this department are the Royal College of Science, Dublin, and the Metropolitan School of Art. Throughout the provinces the work is being organized by the councils of county boroughs, urban districts, and counties. The annual grant for the technical instruction is \$25,895,000. Provisions are made for the

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special training of teachers for the different departments of work.

Language and Literature.—The predominant in the Irish literature is the heroic, pathetic, love of nature, romance, virtue, and through all runs the traditional. Although the Ogham, a system of writing, was introduced into Ireland about 13 centuries before Christ, yet the literary productions were transmitted orally. Hyde says, "The love of literature of a traditional type, in song, in poem, in saga, was more nearly universal in Ireland than in any other country of western Europe."

The modern literature of Ireland, or the literature produced by Irish writers of the last centuries, has been included under English literature because the language used is English. See CELTIC LANGUAGES.

Music.—See IRISH MUSIC.

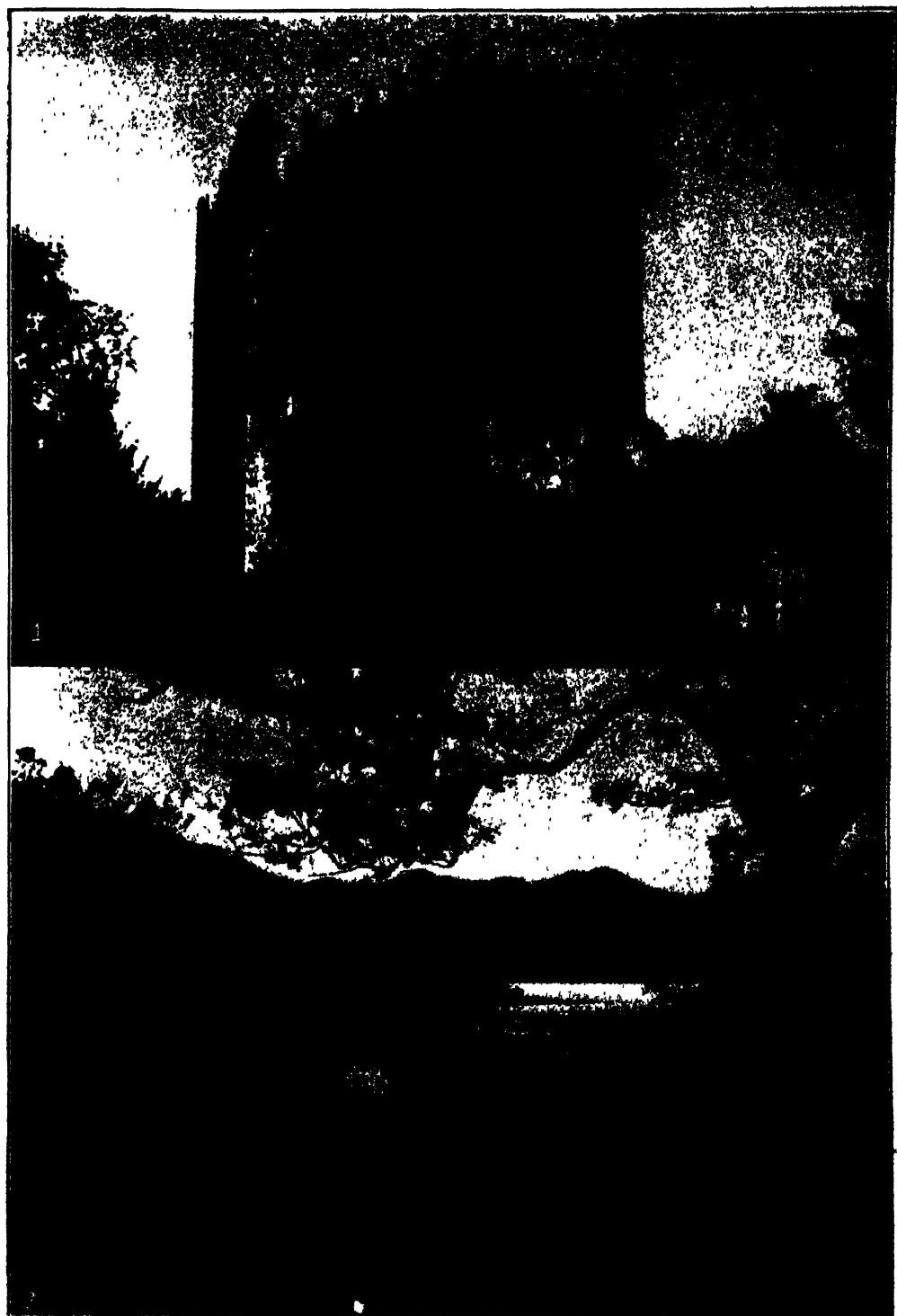
Art and Architecture.—Many of the ancient types of architecture extinct in other lands may still be found in Ireland. Their buildings and home life remained practically undisturbed for centuries; no ancient Roman architecture is found on the island. When Christianity was introduced, the change in form of the Druid temple was for several centuries in accordance with the natural development of the people, except the addition of the small cross, the windows facing the east, and the altar. When the building became too small a new one was erected beside it. Some of the existing ancient specimens are a group of stone buildings on Skellig Michael, a rock rising precipitously out of the sea to the height of 700 feet, and about eight miles due west of the nearest headland in the County Kerry. The approach is by a flight of stone steps. Dry rubble masonry forms the walls, and in this group, as in others, the absence of the arch shows its ancient origin. It is oval outside, bee-hive in form, but rectangular within. The door has a horizontal lintel, above which is a small cross worked into the stone wall. The six cells in the interior, the common room for prayer (choir), the chapel, all show it was occupied by monks. The doors, with inclined jambs and horizontal lintels, antedate the arch. A wider lintel above, or the double lintel, indicates progression in architecture, a method of relieving the pressure of the roofs. The roofs of the ancient buildings were of stone. There are many of these ancient ruins, some in a good state of preservation. Off the coast of Sligo, at Inishmurray, on the Isles of Aran, on islands off the coast of Kerry, and in many places are found buildings of dry rubble masonry. The change shows itself when cement is used and the walls become perpendicular, as at Gallarus, in Kerry, and a further advance is shown in St. Declan's oratory in Ardmore, with square perpendicular towers, or, more properly, supports at the corners. Some of these were erected in the 6th, 7th, and 8th centuries. St. Colum-Cille's monastery at Kells was built about 807 A.D. In the 'Annals of the Four Masters' mention is made of the church St. Kevin founded in about 1108, and which is still in existence, at Glendalough. The Romanesque style makes its appearance in the 11th century; the earliest example is in St. Flannan's, at Killaloe. Brian Boroiomhe is said to have built churches at Killaloe, in County Clare. A church built about this time, at Freshford, the ancient Achadh-ur, eight miles northwest of Kilkenny, is still in use. At

Clonfert Cathedral, in County Galway, there is a fine example of an Irish Romanesque doorway. This church is said to have been founded by St. Brendan, "the navigator." The interlaced patterns on the piers, the ornamented column, are all most beautiful. "There is not," says Mr. Brash, "a square inch of any portion of this beautiful doorway without the mark of the sculptor's tool, every bit of the work being finished with the greatest accuracy." The Cathedral at Ardmore, County Waterford, shows another advance in its decoration; here may be seen The Judgment of Solomon, Adam and Eve, The Magi bringing their gifts, the stable indicated by a cow, etc. Many of the modern cathedrals are most beautiful.

The "Round Towers" of Ireland have been for years subjects of study and discussion. There exist in Ireland in whole or part about 100 of those towers; 18 are in a perfect condition. Many claim that the Round Towers are of pre-Christian origin, and cite the similar towers, two in Scotland, seven on islands off the coast, one on the Isle of Man, and a few on the Continent, as examples of pagan architecture. Their average size is 100 feet in height, circumference at base, 50 feet, walls at door lintel, 3½ feet. The interior is divided into from four to eight stories. Petrie, who has studied the subject with care, claims that the towers are of Christian origin and were used both as bell towers and as safes or places in which to deposit the Church treasures. The Irish name for the towers, *Cloigthcach*, which means "house of a bell," supports the theory of Petrie and others. Petrie advances other and strong arguments in support of his theory. The 'Annals of the Four Masters' mentions the bells in some of the towers. One of the finest examples of a Romanesque doorway in a Round Tower is at Kildare. Some of the ancient pottery shows skill and artistic merit. In designing and coloring the ornamentation of the old Celtic manuscripts show great artistic power. The initial letters are most beautiful, especially in the 'Book of Kells,' a copy of the four Gospels in Latin, and in 'Annals of the Four Masters.' The symbolism used by other early nations is not found in the works of the ancient Irish. The designs are geometrical patterns, interlaced ribbon work, diagonal and spiral lines, strange animals, peculiar birds, and the key pattern. The ancient metal work shows unique and beautiful designs; the bell shrines, the brooch of Tara, and many pieces of old metal work may be seen in museums. The laces of Ireland, revived the last of the 19th century, show most intricate and charming patterns. Sculpture and oil painting are modern arts in Ireland, and in both many of Irish birth have excelled.

Religion.—The first authentic account of the introduction of Christianity into Ireland was in the 5th century, when Pope Celestine sent Germanus, bishop of Auxerre, and later, in 431, Palladius as bishop. Both Germanus and Palladius found on the island believers in Christianity, but no organized body of Christians. However, the chief work of conversion and organization was accomplished by St. Patrick, who, good authorities state, was sent to Ireland by the same pope. Killpatrick, a town of Scotland, is said to have been Patrick's birthplace, but some authorities claim that he was a native of France. He had been consecrated bishop

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1. Blarney Castle.

2. Innisfallen, Lake Killarney.

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before coming to Ireland as a missionary, and he selected Armagh as his see. A large number of converts were made, so many that even before Patrick died he had other bishops and a number of priests to assist him. The Roman Catholic Church in Ireland has four archdioceses and 25 dioceses. The archdioceses are Armagh, Dublin, Cashel, and Tuam. The Roman Catholic clergy and churches are all supported by voluntary contributions. The college at Maynooth, for the education of those studying to become priests, was founded in 1795. There are several other Roman Catholic ecclesiastical seminaries and colleges.

The Reformation never made much progress in Ireland, and though a Protestant Episcopal church was established by law, it was only the church of a small minority. In 1869 it was disestablished. Previous to this time the clergy were supported by a tithe rent-charge, the proceeds of the Church lands, etc., the total annual income of the Church, including the value of houses and lands in occupation, being about \$3,068,920. By the above act, taking effect from 1 Jan. 1871, the position of the Church and clergy was entirely changed, though those holding benefices at the time of its passing have not suffered loss. The property and tithes formerly belonging to the Church are now vested in commissioners, who pay to all deprived of income by the act, so long as they continue to discharge the duties of their offices, such an annual sum of money as they would otherwise have received, deduction being made of curates' salaries, and other outgoings to which the parties would have been liable, and regard being paid to the prospective increase of incomes by the falling in or cessation of such charges; or instead of an annual sum, an equivalent single payment has been paid to such as have commuted their claims in that manner. The Irish Church accordingly is no longer a state Church, and none of its bishops have now a seat in Parliament. It is still a vigorous and flourishing institution, however, and possesses funds amounting to over \$40,640,000. Of this, upward of \$20,000,000 have been voluntarily contributed by friends of the Church since it was disestablished. While disestablishing the Irish Church, the act at the same time declared the cessation of the Maynooth grant and the *Regium Donum*. The affairs of the Irish Church are now managed by the diocesan synods and by the general synod in conjunction with the representative body. The supreme legislative powers reside in the general synod, which meets in Dublin, and is composed of the archbishops of Armagh and Dublin and the 11 bishops, and of lay and clerical representatives from the different dioceses; the lay representatives being more than twice as numerous as the clerical. The representative body incorporated in 1870 consists of the archbishops and bishops *ex officio*, 39 lay and clerical elected members (three for each diocese), and 13 co-opted members elected by the other two classes conjointly. This body is empowered by its charter to hold Church property, subject to the regulations of the general synod. The Church uses the Book of Common Prayer, as revised in accordance with statutes passed by the general synod, and furnished with a preface containing an exposition of its formularies in the sense in which they are understood by the Church.

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The Presbyterian Church of Ireland is chiefly confined to the province of Ulster, where it may be said, more especially in the counties of Down and Antrim, to be the leading religious denomination. Its ministers are supported by voluntary contributions, seat-rents, and church funds. They were formerly aided by an annual grant from government, called the *Regium Donum*, the amount of which, paid in 1869, was \$202,735. This annual grant, however, was abolished, as already mentioned, by the Irish Church Act of 1869, and was commuted to a single sum of \$3,506,860 paid to the Church. According to the census of 1901 there were in Ireland 3,310,028 Roman Catholics, 579,385 Protestant Episcopalians, 443,494 Presbyterians, 61,255 Methodists, and 56,703 members of other persuasions, besides 3,769 Jews.

History.—The beginning of the history of Ireland is, like that of all European nations, enveloped in fable. Among the ancients it was known at least as early as the time of Aristotle, who calls it *Ierne*. In Diodorus Siculus it is called *Iris*; in Strabo, *Ierne*; in Pomponius Mela, *Iverna*; in Pliny, *Hybernia*. Plutarch calls the island *Ogygian*, meaning very ancient, and says: "They drew their history from remote antiquity, so that of other nations is new compared with them." Yet the information to be found about Ireland in the works of the ancient geographers and historians is altogether very scanty. The bardic historians of the country speak of Greek and Phoenician colonies, and lists of kings, for which there is no authentic, but some probable, foundation. The vernacular language of the Irish proves that they are a part of the great Celtic race which was once spread all over Western Europe. The first probable records of the Irish people show that for the times they were advanced in civilization. The ancient bards were called *Filcas* or *Feardanos*, which means philosophers. Cæsar mentions in his 'Gallic Wars' their advancement. Pliny, Cæsar, and other authors say that the Druids who inhabited Ireland were learned; they knew philosophy and the sciences. In the Irish chronicles we find that in the reign of Eochy the First, more than a thousand years before the birth of Christ, "society was classified into seven grades, each marked by the number of colors in its dress, and that in this classification men of learning, that is, eminent scholars, were by law ranked next to royalty." Another proof of the existence of an ancient civilization, marvelous for its time, was the institution of Feis Tara or the Triennial Parliament of Tara. The monarch, Ollav Feola, who reigned as Ard-Ri, or monarch, of Erinn, about 1,000 years before Christ, established this parliament. The subordinate royal princes or chieftains, constituted one branch; the Ollavs or law-givers, and bards, judges, scholars, and historians, another branch; and the third consisted of the military commanders. Under the Ard-Ri, or monarch, were the kings of the provinces, and under each king were the clans who were governed locally by a chief, each clan selecting its own. Wars were frequent, as fighting and bloodshed were common pastimes throughout the then known world. The battle was the final court of appeal, and in most instances the first court of trial. A cause of dissension in Ireland, as in Great Britain and other countries, was the antagonism

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existing among people of different races. The Milesians, the Tuatha de Danaans, and the Firbolgs (q.v.) were distinct races centuries after the Milesians landed in Ireland. The differences among themselves seem not to have seriously affected their union when attacked by a common foe; as at the birth of Christ, when Rome was mistress of nearly all of Europe, she had never gained possession of Ireland. The introduction of Christianity into Ireland was not attended with bloodshed as in many other countries; indeed, afterward the nation seems to have enjoyed a season of repose from strife, although southern Europe was being overrun with the Germanic hordes. This repose favored the growth and expansion of Christianity and the progress of learning. The schools and monasteries founded by Saint Patrick and his bishops in the 5th century became the centres from which went forth many scholars; and even as early as the 6th century, Ireland became the seat of western learning; and its monasteries were the schools from whence missionaries who disseminated the Christian faith throughout continental Europe proceeded. In the 8th and 9th centuries the scholars of Ireland were among the most distinguished at the courts of the kings, especially at that of Charlemagne, but when the Northmen commenced their descents some of the schools were destroyed and the monks dispersed. The ravages of the Danes at this period had results different from the attacks of the Romans. The continued attacks for nearly two centuries fostered internal dissensions, when in the beginning of the 11th century Brian Boromhe (Brian of the Tribute) united the greater part of the island under his sceptre, restored public tranquillity, and subdued the northern invaders. After a contest of about 20 years he conquered Malachy, the brave warrior who "wore the collar of gold" won from the Danish invader, and became Ard-Ri of all Erinn. After the death of Brian, the island became a place of dissension; frequent wars rendered them weak against a foreign foe. This condition was largely the result of the divisions, made by Brian, of the island among his three sons. At this time Henry II. of England, professing love for Ireland and a great desire to restore peace, sought to gain possession of the island. This was the beginning of the Anglo-Norman invasion of Ireland. Henry II. claimed to have received from Pope Adrian IV. a bull authorizing him to take possession of Ireland. (The authenticity of this bull is very doubtful.) After some delays occasioned by internal troubles in England, Henry attempted to gain possession of Ireland. For many years after, the history of Ireland was a record of persecution, confiscation of lands, and attempts to wrest from the people inalienable and hereditary rights. So great was the resistance that in the 14th century, at the time of Richard II., the authority of England extended practically over only a small portion of country on the eastern coast, called "The Pale" (q.v.). This was governed by various nobles subject to a viceroy. The subjection was, however, sometimes little more than nominal. The nobles quarreled among themselves, and were very often at open feud. The beginning of the reign of Edward III. (1327) was marked in Ireland by the outbreak of civil strife in every part of the English "Pale," advantage of which was taken by the

Irish for a general rising, which threatened the safety of the English colonists, and which the government found itself unable to subdue, until it yielded to the demands of the barons in Ireland, by granting them complete civil and military jurisdiction in their own districts. During the wars with France some Irish troops served in the English armies, and the common sympathies induced by that circumstance seemed likely to promote a better state of feeling between the two races, when the breach was made wider than ever by the celebrated statute of Kilkenny (1367), framed under the viceroyalty of Lionel, duke of Clarence, son of Edward III., forbidding, under severe penalties, intermarriages between English and Irish, the assumption of Irish names by persons of English blood, the use of the Irish language, the native (Brehon) law, etc. In consequence of this the disturbances between the Irish and English inhabitants of Ireland increased so greatly that the English viceroy found it necessary to protect The Pale by payments of money to the Irish chiefs, and this state of matters continued during the reigns of Richard II., Henry IV., and Henry V., until, in that of Henry VI., when Richard, duke of York, was appointed governor of the island, who succeeded by his politic measures in restoring peace. In the reign of Henry VII. (1495) was passed Poyning's Act (so called from Sir Edward Poyning, lord-deputy of Ireland), which provided that all former laws passed in England should be in force in Ireland, and that no Irish Parliament should be held without previously stating the reasons on account of which it was to be summoned, and the laws which it was intended to enact. The power of the English government in Ireland was thus strengthened, but nothing was done to improve the condition of the Irish, whom the oppressive severity of the English yoke embittered without subduing. At the beginning of the 16th century the greater part of the island still remained unconquered by the English. The Irish still lived according to their old constitution under their own chiefs. In 1541 Henry VIII. received from the Irish Parliament the title of King of Ireland; but he did nothing to extend the English sway, or to improve the social circumstances of the people. The Reformation which took place in England during this reign took but a slight hold upon Ireland even in the English districts; but the monasteries were suppressed, and the tribute to the Papal see abolished. Elizabeth's reign was marked by a series of risings, which finally terminated in a general war against England, usually called the Rebellion. Hugh O'Neil, who had been raised by the queen to the dignity of Earl of Tyrone, was the leader in this war, which, though successfully begun, ended with the complete defeat of the insurgents, and the reduction of the whole island by the English (1603). More than 600,000 acres of land were taken from the Irish chiefs, and for the most part distributed among English colonists. The reign of James (1603-25) was somewhat favorable to Ireland; the arbitrary power of some of the chieftains was restrained, and the administration of justice improved, etc.; but the means which he took to effect some of these improvements were tyrannical. He demanded from every Irish chief the document upon which he rested his claim to his property, and if it were

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not to be found, or contained even any formal error, his lands were forfeited to the crown. Of 800,000 acres of land which in this way came into the hands of the king in the north of the island, a large share was entirely withdrawn from the Irish, and divided among Scotch or English settlers. In addition to this, the Catholics, on account of the oath of supremacy by which all public officers were required to acknowledge the king as head of the church, remained excluded from all official appointments. The Roman Catholic hierarchy established in the 5th century was still in existence. Various circumstances, led, in 1641, to an attempt to shake off the English yoke. Dr. Lintard says of this insurrection that it has been usual, for writers to paint the atrocities of the natives, and to omit those of their opponents, but that revolting barbarities are still recorded of both, and that if among the one there were monsters who thirsted for blood, there were among the other those who had long been accustomed to deem the life of a mere Irishman beneath their notice. After the death of Charles I., Cromwell was appointed (15 Aug. 1649) lieutenant of Ireland. With great cruelty, he reduced the whole country within nine months. All the possessions of the Catholics were confiscated, about 20,000 Irish were sold as slaves in America, and 40,000 entered into foreign service, to escape the severity of the conqueror. (See Drogheda.) Charles II. restored a portion of the lands, but fully two-thirds remained in possession of the English or of Irish who had become Protestants. Under James II. some changes were made; under his viceroy, Earl of Tyrconnell, Catholics were given a fair representation in Parliament. In the English Revolution of 1688, the Catholics of Ireland sided with James, and the Protestants with William III. For a time the army favoring James were fairly successful; but the landing of William in Ireland changed matters. The battle, 1 July 1690, at Boyne, won by William, proved a turning point, as it encouraged the English and in a great measure discouraged the Irish. Sarsfield's gallant defense of Limerick, the last place in Ireland that held out for James, saved that city from capture by William's troops; but on 3 Oct. 1690, the city capitulated, a treaty being concluded with Gen. Ginkel on behalf of the English, according to which the Irish were to be allowed the free exercise of their religion, as had been granted by Charles II. More than 12,000 Irish that had fought on the side of James went into voluntary exile. The Treaty of Limerick was not kept by the English, a fact which is commemorated by the name which the Irish still give to the place at which it was concluded, "The City of the Violated Treaty." By a decree of the English Parliament upward of 1,000,000 acres of land were now confiscated and divided among Protestants. In order to keep down every movement of the Catholic population, cruel penal laws were passed against those who adhered to that form of religion. By these laws the higher Roman Catholic ecclesiastical dignitaries were banished from the island; the priests were not allowed to leave their counties; no Roman Catholic could hold a public office, acquire landed property, enter into a marriage with a Protestant, etc. Such suppression and persecution naturally led to the formation of secret organizations whose object would be an

overthrow of those in power, in order to secure freedom and justice. "Whiteboys," "Levellers," and a number of kindred organizations were formed, whose methods were not always fair; but who were brought into existence by force of circumstances. All this, however, did not ameliorate the general condition of the country, and it was not till the American War of Independence taught the English government the folly of attempting to govern a people by coercion, that the severity of the laws relating to Ireland was mitigated. In 1778 the penal laws against the Catholics, although not repealed, were made much more lenient. Catholics were henceforth permitted to acquire landed property, to erect schools, and to observe their own religion under fewer restrictions. In 1783, Poynings Act was repealed.

The outbreak of the French Revolution had naturally a great effect on the minds of the Irish people. Out of a corps of volunteers which had been formed in 1779, but which had been dissolved a few years later, a society was formed calling itself the Society of United Irishmen, which included in it many Protestants, and which sought to make Ireland an independent nation. The Catholics at the same time took advantage of the embarrassment of the British government to demand equal rights with the Protestants, and the government gave in to this demand so far as to remove the hindrances which had been placed by the law in the way of Irish trade and industry, and to repeal nearly all that remained of the penal laws against the Catholics, who now received the right of acting as counsel before the court, and of entering into marriages with Protestants. When further demands were refused, the Society of United Irishmen allowed its revolutionary aims to become more apparent, and the government then determined to quell the movement by force. The Habeas Corpus Act, which had been introduced into the country in 1782, was repealed; the towns were strongly garrisoned, and the society dissolved and disarmed. But the conspirators, trusting to expected aid from France, were not discouraged. At the close of 1796 a considerable French fleet did actually appear off the Irish coast bearing 25,000 land troops, under the command of Gen. Hoche; but owing to adverse winds, and the incompetence of the commanders, it was obliged to return without having accomplished anything. The only effect of this expedition was to induce the government to take still stronger measures in Ireland, the whole of which was placed under military law. The United Irishmen were thus prevented from taking any open steps for renewing the society, but they continued to pursue their ends in secret, and devised for themselves a very skilful military organization. At its head was a directory of five men, whose names were known only to those at the head of the provincial committees. In January 1798 the society already numbered more than 500,000 members, when a treacherous member gave information regarding the society to the government, and several of the leaders were seized. In consequence of this the conspirators, not knowing the extent of the revelations that had been made, resolved to anticipate any further preventive measures on the part of the government, and rushed into premature action. In May 1798, simultaneous

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risings took place at different parts of the island; but the government was fully prepared, and the main body of the insurgents, who made a brave fight, suffered a decisive defeat at Vinegar Hill on 21 June. Flying columns traversed the island, and checked by the most violent measures any further outbreaks. In August a French squadron appeared in Killala Bay with 1,500 men on board, under Gen. Humbert; but the British troops prevented a junction with the insurgents, so that they were soon compelled to surrender. Another French expedition which approached the Irish coast in September was overtaken and attacked by Admiral Warren, and nearly all the ships composing it were captured. Several subsequent attempts of the French were similarly frustrated.

The events of this insurrection brought the British government to form the resolution of uniting the Irish and English Parliaments, since in the state of feeling which that movement too plainly manifested as prevailing among the people, it was seen that the independence of legislation enjoyed by the country fostered the desire of political independence, and it was feared that new revolutionary efforts might thence derive a legal sanction. The first proposal to this effect which was made in the Irish Parliament was rejected with indignation. The government then resorted to bribery to secure its purpose, and \$8,000,000 was spent in buying up the rotten boroughs which had the majority of seats in the Irish House of Commons. The Irish landlords were from the first favorable to the project. By these means an act providing for the legislative union of the two countries passed the Irish Parliament on 26 May 1800, and the British Parliament on 2 July in the same year, in virtue of which the union was effected on 1 Jan. 1801. But although this measure bound the destinies of Ireland still more closely to those of England, yet it was far from putting an end to the religious and political troubles which had so long divided the two countries. In order to gain the masses the enlightened Pitt had promised a complete political emancipation of the Catholics; but the bigoted George III. could not be induced to make this concession. Enraged at this great breach of faith the Catholics in 1802 formed a Catholic Association, having for its object the accomplishment of this end; but it was not till the period of O'Connell's agitation, favored by a change of public opinion in England, that the government was induced to bring in an Emancipation Bill, which after passing both houses of Parliament, received the assent of George IV. on 13 April 1829. A new oath, which could be taken by Catholics as well as Protestants, was substituted for the one previously required from members of Parliament, and the Catholics were thus enabled to take a seat in the house. They were also allowed to fill all public offices except that of lord-chancellor.

This victory was greeted by the Irish Catholics with great joy; but they wanted more than emancipation which meant permission to hold certain offices, they wanted independence. The efforts of the national party were now directed to the repeal of the Union, for which purpose O'Connell founded the Repeal Association, which caused the Grey ministry in 1833 to bring before Parliament the Irish Coercion Bill (q.v.).

When this bill became law the Lord-Lieutenant of Ireland was empowered to forbid all assemblies of the people, and to proclaim military law throughout the island; and in order to give force to the act an army of 36,000 men, besides 6,000 armed police, was sent over. The Coercion Act was indeed soon repealed, and from 1835, under the viceroyalty of Lord Mulgrave, a better feeling seemed to be growing up between the people and the government. But when the Tories came again into power in August 1841, O'Connell began anew the repeal agitation, and with such boldness that in 1843 the authorities caused him to be apprehended on a charge of conspiracy and sedition, on which he was convicted and condemned to pay a fine and suffer imprisonment for a year. These proceedings were, however, declared illegal by the House of Lords, and O'Connell was released. Soon after the terrible famine which visited Ireland in the autumn of 1845, and still more severely in the summer of 1846, cast all other interests into the background. The spirit of the people seemed broken, and many of them sadly left their native land and by hundreds of thousands emigrated to America. In the midst of this crisis O'Connell died, and the place of the party which he led was taken by one still more advanced, which received the name of Young Ireland. In these circumstances of political excitement the French revolution, which took place in February 1848, had a great effect upon Ireland. The leaders of the Young Ireland party, Smith O'Brien, Mitchel, Duffy, Meagher, and others, entered into relations with the provisional government at Paris, and the people generally began openly to provide themselves with arms, and to exercise themselves in the use of them. But the measures of the government frustrated the designs of the conspirators. The Habeas Corpus Act was suspended, the insurrectionary newspapers suppressed, and Smith O'Brien, who had been hailed by the people as King of Munster, and a number of his associates were arrested and condemned to death. This punishment was afterward commuted to transportation. In a short time peace was restored; but the material distress remained undiminished. Famine and disease decimated the population. The agricultural holdings were deserted, whole districts remained uncultivated, and a constant and overflowing stream of emigration directed itself toward the United States.

After a time agriculture revived, and the manufacturing industries of the island began to compete with those of England. In 1849 were chartered the Queen's Colleges, offering the same advantages to Catholics as to Protestants; but these institutions have been taken comparatively little advantage of by the former. The history of those institutions made the Catholics fear they were meant as a menace to their faith. In 1852 telegraphic communication was opened with Great Britain. In 1853 an industrial exhibition was held at Dublin, resembling that held two years before in London; another exhibition was held in 1865. The latter year witnessed the discovery of a new conspiracy designed to effect a separation between England and Ireland. This had its origin in America at the time of the Civil War in the United States, when the numerous Irish in that country saw an opportunity in England's attitude toward the seceding States. This conspiracy, originating among the

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members of a secret society calling themselves Fenians (see FENIANS), soon spread to Ireland; but before the Fenians could take any overt action in that island their design was stifled by the proceedings of the British government (1865-6). The attention of English statesmen was now strongly drawn to the necessity of doing all that could be done to render the Irish people loyal and contented; and with this view an act to disestablish the Irish Protestant Episcopal Church was passed in 1869, and another to improve the tenure of land, in 1870. Since 1871 an agitation for what is called Home Rule has made itself prominent. In 1880 Ireland became the scene of an agitation carried on mainly by a body calling themselves the Land League. Various severe laws were passed to "coerce," but further concessions were made, and to redress Irish grievances a land act was also passed in August 1881. Under this act substantial reductions on rents were made. The Land League was suppressed, but a new body called the National League was soon organized in its place. Another act for the relief of tenants in arrear with their rents was passed, 1885. In 1885, 86 Nationalist members, headed by C. S. Parnell, were returned to Parliament, and their pressure on the government led to the production of a scheme by Mr. Gladstone, in 1886, by which Ireland was to receive a parliament of her own and the Irish members to be withdrawn from the Imperial Parliament. This scheme and the accompanying land purchase scheme were rejected by Parliament and the constituencies; and a fresh act against crime in Ireland was passed in 1887, although statistics showed the island was in a most peaceable condition, and no remarkable acts of lawlessness were being committed. In 1898 a very important Local Government (Ireland) Act was passed. It established county councils, urban district councils, rural district councils, and boards of guardians in Ireland, and transferred to them the administrative functions formerly discharged by the grand juries and presentment sessions. The first elections under the act took place early in 1899. The results showed that the voters of Ireland realized they were gaining ground. They never lost an opportunity to proclaim their discontent with the existing land laws, and their desire for "Home Rule." The Irish members of the British Parliament kept the cause of Ireland before the people; and in 1903 a further concession was gained. On 1 Nov. 1903 a new "Land Act" went into effect whereby the tenants, sub-tenants, or the people, may purchase the land and hold it as their own. Arrangements were made to assist the tenant in making the purchase.

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B. E. BURKE,

Editorial Staff 'Encyclopædia Americana'

Ireland, Church of. See IRELAND.

Ireland, Language of. See CELTIC LANGUAGE.

Irenæus, i-rē-nē'ūs, Saint, one of the Greek Church Fathers: b. Asia Minor: d. Lyons, France, about 202. He was a learned and zealous man, a pupil of Polycarp and Papias. He actively opposed the Gnostics, and especially the Valentinians. His works are lost, except his 'Libri V. aduersus Hæreses,' of which there are fragments in the original Greek, and a Latin version, made, it is supposed, toward the end of the 4th century. He suffered martyrdom at Lyons, of which he was bishop, in the persecution under Septimius Severus.

Irene, i-rē'nē, empress of Constantinople: b. Athens about 752 A.D.; d. Lesbos 15 Aug. 803. In 769 she married Leo IV., after whose death, caused, as is generally believed, by poison administered by her, she raised herself (780) and her son Constantine VI., then but nine years old, to the imperial throne. When Constantine came of age he refused to permit her to participate in the government, and seven years later was arrested at the order of his mother, blinded and at last murdered. Irene was the first woman who reigned over the Eastern Empire. Her triumphal entrance into Constantinople, her liberality, the freedom bestowed on all prisoners, and other artifices employed by her, were not sufficient to secure her from the consequences of her criminal accession. She had ordered many nobles into banishment, when Nicephorus, her treasurer, who had secretly been made emperor, exiled her in 802 to the Isle of Lesbos. Her zeal for image-worship has caused her to be regarded as a saint by the Greek Church.

Irton, ir'tōn, Henry, English general and statesman: b. Attenton, Nottinghamshire, 1611; d. Limerick, Ireland, 26 Nov. 1651. He was graduated at Trinity College, Oxford, and brought up to the law; but when the civil contests commenced joined the parliamentary army,

IRIDIUM—IRISH ACADEMY

and by the interest of Cromwell, whose daughter Bridget he married in 1646, became commissary-general. At the battle of Naseby he commanded the left wing, which was defeated by the furious onset of Prince Rupert, and was himself wounded and made prisoner. He soon recovered his liberty, and took a prominent part in all the transactions which threw the Parliament into the power of the army. He had also a principal hand in framing the ordinance for the king's trial, and was one of the judges. Ireton accompanied Cromwell to Ireland in 1649, and was left by him in that island as lord-deputy. He reduced the natives to obedience with great vigor, but not without cruelty. He was buried in Westminster Abbey, and after the Restoration his body was taken up, suspended from the gallows with that of Cromwell, and buried in the same pit.

Irid'ium, a metallic element resembling platinum in its general properties, and occurring in nature in the metallic form, alloyed, usually, with platinum and osmium. The commercial supply comes chiefly from the Ural district, from Brazil, and from Borneo. Small amounts have also been obtained from California. The existence of iridium was first recognized, in 1802, by Tennant, who observed that an insoluble residue remained behind after dissolving platinum ore in aqua regia. In 1804 he showed that this residue contains two new metals, to which he gave the respective names "iridium" and "osmium." The separation of iridium from the other metals of the platinum group is a matter of some difficulty; and for details of the processes employed the more extended treatises on metallurgy and the chemistry of the metals must be consulted. Iridium is frequently obtained in the form of a spongy gray mass, or a gray powder; but by heating either of these to whiteness, and subjecting them to compression, the metal may be brought into the form of a compact, lustrous mass resembling steel. In this form it is harder than iron, and somewhat malleable when hot, though brittle when cold. At ordinary temperatures it has a specific gravity of about 22.4, being, with the exception of osmium, the heaviest substance known. Its specific heat is about 0.0323 at ordinary temperatures, and its coefficient of linear expansion (Fahrenheit) is about 0.0000039. Its melting point is very high, the estimates given by various authorities ranging from 3,600° F. to 4,500° F. Compact iridium, after being strongly heated, is insoluble in all acids, and is not affected by air or moisture. The metal has the symbol Ir, and an atomic weight of 193 if O = 16, or 191.5 if H = 1. It forms numerous salts, but these are of no practical importance. The name "iridium" (from Greek, "rainbow,") refers to the varied colors exhibited by the salts of this element, as they pass from one state of oxidation to another. Metallic iridium, either alone or alloyed with other metals of the platinum group, is used in the arts to a limited extent, where a hard, non-corrosive metal is needed. In particular, it is used for the tips of gold and stylographic pens, for the construction of standards of length, and for standard electrical resistance coils.

Iridosmine, Ir-i-dös'min, or **Osmiridium**, a natural alloy of iridium and osmium in varying proportions, is a hard slightly malleable mineral, crystallizing in hexagonal prisms. It occurs

as irregularly flattened grains, and contains some platinum, rhodium and other metals of the platinum group. It is found associated with platinum in the Ural Mountains, in South America, and elsewhere. It is also found in the black sands on the ocean beaches of northern California, and a small amount is recovered yearly by placer miners in the Sierra Nevada. Iridosmine is used to a small extent for pointing gold pens.

Iriga, ē-rē'gā, Philippines, pueblo of the province of Ambos Camarines (Sur), Luzón, on the Buhi River, 23 miles southeast of Nueva Cáceres. It is on the main road, is a military and telegraph station, and one of the most important towns in the province. Pop. 17,100.

Iris, ī'ris, in Greek mythology, daughter of Thaumas and Electra, sister of the Harpies, the fleet golden-winged messenger and servant of the Olympian gods, especially of Zeus and Hera. Iris was originally the personification of the rainbow, though she does not appear in the Homeric poems as the goddess of the rainbow. She is sometimes represented as a beautiful virgin with wings and a variegated dress, with a rainbow above her, or a cloud on her head exhibiting all the colors of the rainbow.

Iris Family, a natural order of monocotyledonous herbs, mostly perennials with tubers, corms or rhizomes, and usually with an acrid flavor. About 800 species belonging to more than 50 genera have been described from temperate and tropical climates, mostly from South Africa and tropical America. They are characterized by two rows of leaves, the outer of which fit over and protect the inner (equitant); regular or irregular perfect flowers which are frequently handsome; perianth six parted, the other floral organs in threes; and many-seeded, three-celled fruits (capsules). Some species have been used as food in countries where they are native; others furnish rootstocks which are used for making perfumes, especially orris; some few have been employed to a limited extent in medicine; but the species most widely popular are cultivated for ornamental purposes. Of these last the most important genera are *Iris* (hearts-de-lis), *Gladiolus*, *Freesia*, *Crocus*, *Tigridia*, *Tritonia*, *Sisyrinchium*, *Ixia* and *Beleamcanda*, elsewhere described.

The plants of the genus *Iris* constitute one of the chief ornaments of the northern regions of the globe, and usually grow in wet places, bearing flowers of various colors, but the prevailing tint is blue. The common wild iris or flag (*I. pseudacorus*), common in Europe and also found in the eastern United States, has yellow flowers of large size and long sword-like leaves. The gladdon or stinking iris (*I. fätidissima*) is a British species, with bluish flowers. Among favorite garden species are the English iris (*I. xiphioides*), the Persian iris (*I. persica*), the common iris (*I. germanica*), the snake's-head iris (*I. tuberosa*), and the Chalcedonian iris (*I. susiana*). Orris root consists of the rootstocks of the white-flowered *I. florentina* and some other species. Among other species found in the United States are the larger blue flag (*I. versicolor*), common from the Atlantic coast to the Mississippi, the slender blue flag (*I. virginica*), and several dwarf species.

Irish Academy, Royal, a literary and archaeological association founded in Dublin, Ire-

IRISH CATHOLIC BENEVOLENT UNION—IRISH LAND LAWS

land, in 1786. Its object is to promote the study of literature, antiquities, and science. The library founded and owned by the association contains a large number of Irish manuscripts and documents of public interest. It has a fine collection of antiquities which have been loaned to the National Museum, Dublin. The association is governed by a council consisting of 21 members. This council meets regularly several times a year. The work is divided among the members, who are subdivided into committees. The committees are three in number; committee of literature, committee of science, committee of antiquities. Students making historical research in Ireland have found this association of great assistance.

Irish Catholic Benevolent Union, a fraternal organization founded in the United States in 1869. It has 149 subordinate societies and 14,000 members. The benefits disbursed since organization have amounted to over \$2,500,000, and during the year 1902 amounted to \$45,371. The membership in the union is confined to persons of Irish extraction who are communicants in the Roman Catholic Church.

Irish Deer, or Elk. See ELK.

Irish Language, Society for the Preservation of, an organization established in 1873, in Boston, Mass. The object is to foster the study of the Gaelic language so that it may again be one of the spoken languages of the Irish people. At first the society was called the Philo-Celtic Society. The headquarters are now in Dublin, where the organization was established in 1877. It has a number of branches in different parts of the United States.

Irish Land Laws. Under the Breton laws, when the people of Ireland were divided into tribes, the land was usually the property of one of the four or five tribes which were the strongest in Erin. A large portion was given to the king or chief of the tribe, then divided among the clans that made up the tribe. Here again a large portion was given to the chief of the clan and then divided among the septs. The chief of the septs received the largest portion of the amount set apart for the sept. The free tribesmen, after the chief, received the greater part of the sept lands.

Some of the tribesmen, the Ceil, owned cattle, some, the Daer and Saer, were loaned cattle by the chief. The Fuidhir were the tenants who performed the manual labor.

When a chief died, the tribesmen distributed his land among his descendants, and when a tribesman died, the chief distributed his property. After England took possession of Ireland, the land tenure in a large part of the island continued to be administered under the Breton laws; but within "The Pale" the English feudal system prevailed; there the king alone owned the land and the tenants derived ownership from him. Gradually England forced her land laws upon Ireland. This was done by driving the "rebellious Irish" out of certain counties, Kings and Queens, then all Ulster, when the Ulster plantation was established, in 1607. Other confiscations and dispossessions took place until all Ireland came under the English law. Cromwell took forcibly the best lands of Munster and Leinster and a large part of Ulster, and divided the whole among his sol-

diers. Although some of the lands were restored later, it was retaken, by act of Parliament, under William III. Naturally the chiefs and leaders among the people of Ireland were deprived of their lands and the friends of the king of England or the English government, were given Irish possessions as a reward. The penal laws later made it a crime for a Catholic to acquire or hold land. Thus the Irish land question virtually began with the entrance of Henry II. into Ireland. With the Irish owners deprived of their lands there was instituted the system of "landlordism" which has been a hindrance to Ireland's progress. The majority of those who owned the land did not live upon it, and usually the money received for rent was spent in a foreign country. The landlord owned only the land, the houses had to be built and all improvements had to be made by the tenant and at his own expense. The more a holding was improved, the more rent was demanded. The "middle men" who held lands under the owner, and sublet to tenants were the means of increasing the burdens of the peasantry. The commission under Lord Devon, in 1843, to investigate conditions in Ireland, revealed an alarming state of affairs and the famine of 1846-8 brought the Irish Land question to the notice of the whole civilized world, even many of the English statesmen who had censured Irish shiftlessness were astonished when they learned the nature of the land laws which gave power of eviction without any remuneration for improvements; and the wonder was that so much thrift and industry existed. In 1847 Lord Russel endeavored to have Parliament pass an act to protect the tenant against loss by eviction. This measure failed, and others accepted by Parliament later proved ineffectual. Two years after the terrible devastation by famine, the Tenant Right League was organized in Dublin, and its members began a systematic campaign to elect to Parliament members pledged to support measures for the relief of the tenants. The Land Acts of 1860, under the Palmerston ministry, may be said to have resulted from the agitation kept up by the Tenant Right League. Various other organizations for the betterment of the people of Ireland were established, and among them were "physical force" societies. In 1870, under the Gladstone ministry, three new laws were enacted; that a tenant could not be evicted if his rent were paid; that this non-payment must be for at least three years; and that if the tenant choose, he might sell his improvements. This purchase of improvement clause was a great advance in favor of tenants' rights. The Land League in various parts of the world, especially the United States, continued the agitation and brought the question of the wrongs of the Irish tenants before the whole world. The Ashbourne Act of 1885 provided for the purchase of the lands by the tenants and nearly \$25,000,000 was set aside for that purpose. Later a like amount was added. In 1891 the Balfour Law Purchase bill was passed and nearly \$150,000,000 was provided for its enactment. In 1896 this law was improved; but for various reasons all the laws enacted by Parliament proved ineffective only in so far as the bringing of the matter to the notice of fair-minded statesmen. (See LAND LEAGUE) The most radical and satisfactory "Land Purchase Bill" was enacted 14 Aug. 1903, whereby the tenant

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may purchase and own land and the government will, under certain and fair conditions, be responsible for the payment. To George Wyndham, who as chief secretary for Ireland, prepared the bill, the credit is largely due for the passage of the act. (See **WYNDHAM, GEORGE**) Consult: Reports on the "Land Purchase" acts for relief of Ireland; Hansard's "Parliamentary Debates"; Guinell, 'The Breton Laws'; Maine, 'Lectures on the Early History of Institutions'; Fisher, 'History of Landholding in Ireland'; Richey, 'The Irish Land Law'; Godkin, 'The Land War in Ireland'; Richey, 'The Irish Landlord.'

Irish Literary Society, an organization established in 1892, in London. Its object is to promote the study of Irish literature, music, art, and history. Some of the leading Irish literary men and women of England and Ireland are active or honorary members, and strive in many ways to promote the work of the society. The society provides lecture courses on topics pertaining to literary Ireland, and it has a large library which may be used by any of its members. Some of the members are Justin McCarthy, W. B. Yeats, Rev. Stopford Brooke, Barry O'Brien, and several of the well known writers among the Irish women. There were (in 1903) about 625 members.

Irish (Gaelic) Literature. See **CELTIC LITERATURE**.

Irish Moss, an edible dulse or seaweed. See **CARRAGEEN**.

Irish Music has been celebrated from almost prehistoric times. Irish teachers of the art as early as the 7th century holding high rank as specialists in the faculties of continental and English colleges. While the bagpipe was the popular instrument of the common people, the harp was in great favor among the noble and educated classes, and their professional harpists were noted for their skill. The Irish scale originally consisting of five notes, gradually developed with the addition of a sixth and a seventh, until the Irish harp had a finely graduated scale of tones and semitones either in the key of C or G, extending through a compass of four octaves. A harp in the museum of Trinity College, Dublin, said to be that of Brian Boru, has 30 strings, and the Dallway harp, made in 1621, has 52 strings. The national temperament was so musically imbued that there were special songs and airs for different crafts and for almost every conceivable occasion. War marches were played by the pipers at the head of the clansmen marching to battle; spinning, weaving, smithy, plowing, boating, and sporting songs were in daily use, and there were even milking songs, slow and plaintive airs which had the effect of soothing the cows and induced them to submit gently to the milking operation. In Irish literature, native music is frequently classed under three different styles, known as mirth, sorrow, and sleep music, comprising (1) lively, spirited pieces, as jigs, reels, hornpipes and other dance music; (2) solemn and slow pieces, as laments or dirges, commonly called *canticles* or *keens*, and sung on the occasion of a death; (3) plaintive and soothing airs, such as nurse tunes, cradle songs, lullabies, etc. In the numerous collections of these airs, about 2,000 different melodies are preserved, some of the

most popular being 'Savourneen Dheelish,' 'Eileen Aroon' (popularly known by the Scotch appropriation 'Robin Adair'), 'The Coolin,' 'Garryowen,' 'Langolee,' 'Molly Asthore' and 'Patrick's Day.' With the universal spread of music after the 17th century, Irish music as a national feature became merged in the general history of the art. Turlogh Carolan, Carroll O'Daly, Reilly and the Conallons were among the chief of Ireland's ancient harpists and musicians. In modern times Ireland's musical productivity is represented by Michael William Balfe, William Vincent Wallace, Sir Charles Villiers Stanford, and others. Consult: Graves and Stanford, 'Songs of Old Ireland and Irish Songs and Ballads' (1882-92); id., 'Songs of Erin'; Graves and Wood, 'Irish Folk Song'; Graves, 'Songs of Irish Wit and Humor'; and collections of Bunting, Joyce, Moore and Petrie.

Irish Presbyterian Church, formerly called the Synod of Ulster. Its members are mostly descended from the Scotch Presbyterians, who migrated to Ireland by invitation of James I., between 1609 and 1612, to colonize Ulster.

Irish Sea, the body of water between England and Ireland. It is connected with the Atlantic Ocean on the north by the North Channel, and on the south by Saint George's Channel. The north shore of Wales and the southwest shore of Scotland are washed by this sea. It is almost circular in form, about 140 miles north and south, and the same east and west. The largest arms of the sea are on the west shore. The Morecambe Bay on the coast of England, and several large fiords. Dublin and Dundalk bays are the most important on the west coast. The only large islands are the Isle of Man in the north, about midway between England and Ireland, and Anglesey off the northwest coast and a part of Wales.

Irish Terrier, a rough-coated, strongly built terrier, resembling the Welsh and Scotch terriers. See **Dog**.

Irish Texts Society, an organization established in London. Its object is to promote the study of Irish literature,—that is, of literature in the Irish text. They foster societies and issue publications to aid the work. In 1900 they published their third volume, which contained the poems of Egan O'Rahilly. In 1901 their annual volume contained Keating's 'History of Ireland,' edited by David Comyn. The volume of 1903 contains an 'Irish-English Dictionary.'

Iritis, i-rī'tis, inflammation of the iris, the colored curtain that shows the pupil in its centre. This disease follows several types, depending on the kind and virulence of the causative agent. In the serous form there is an exudation of blood-serum into the space in front of the iris, and more or less fibrinous matter that tends to glue the parts together. Pain shoots through the whole eyeball, and vision is dimmed by the turbid fluid. Persistent adhesions to the lens are formed, causing a permanent distortion of the shape of the pupil. Another form is the plastic, in which the pupil is actually occluded by the fibrinous deposits. Rheumatism and syphilis are the two most frequent causes of the malady, but many constitutional diseases—as gout, diabetes, anæmias, and menstrual disorders—may be factors in causing the disturbance, and it may also be secondary to diseases

IRKUTSK — IRON

in other parts of the eye, or even in the other eye, as in sympathetic ophthalmia. The treatment consists of dilating the pupil by dropping solutions of some drug, as atropine, into the conjunctival sac, treating the constitutional disease at the seat of the malady, and in relieving the pain by hot fomentations, blood letting, and the administration of drugs that are sedative. Syphilitic iritis is a lesion of the third stage of syphilis (q.v.), where tiny spots called gummata grow in the substance of the iris.

Irkutsk, Ir'kootsk, a provincial government of Russia, in eastern Siberia, separated from China by the Sayan Mountains. It has an area of 287,061 square miles. The country is generally mountainous, but produces rye, barley, oats and vegetables. The most important rivers are the Angara, Lena and its tributary the Vitim. Gold, iron, and salt figure foremost among the mineral products. Agriculture, cattle-breeding, and the transport of goods to and from China are the chief occupations of the people. Pop. 501,237 (one third exiles and forced colonists). The capital city, Irkutsk, on the Angara, is the residence of the governor-general of eastern Siberia and the seat of a bishop.

Iron, a common and exceedingly useful metallic element, which has been known and used in the arts for many centuries. It occurs in nature in the metallic form, both in meteorites and in certain lavas and volcanic rocks; but the commercial supply is obtained by the reduction of the oxids (or other ores) of the metal, by strongly heating them in a blast furnace with carbon. Iron is grayish in color, with a marked lustre. It crystallizes in the isometric system, usually in the form of cubes or octahedra. The melting point of iron varies to a considerable extent, according to the impurities with which the metal is associated, and also, apparently, according to the physical condition of the iron itself. Pictet gives it as about 2900° F. for iron that is sensibly pure. The specific gravity of the metal also varies to a considerable extent, the determinations ranging from 6.95 to 8.2. The specific gravity of pure iron, at 60° F., may be taken to be 7.85. The specific heat of the metal is about 0.112 at ordinary temperatures, and its coefficient of expansion (on the Fahrenheit scale) is about 0.0000068. Taking the electrical conductivity of mercury (at 32° F.) as unity, the conductivity of iron is about 9.68 at 32° F., and 6.19 at 212° F. Iron is the most magnetic substance known. Soft, pure iron is capable of being magnetized very highly when surrounded by a solenoid of wire that is conveying an electrical current; but its magnetization persists only while the electric current is flowing, falling off, upon the cessation of the current, to a value that is practically negligible. It is upon this property of temporary magnetization that the action of the telephone, the telegraph, and many other useful electrical inventions depends. (See MAGNETISM; and for a full discussion of the phenomena of magnetization, consult Ewing, 'Magnetic Induction in Iron and Other Metals.') Hardened steel, when magnetized by the action of the electric current (or otherwise), retains a large proportion of its magnetism permanently. Iron becomes non-magnetic at a red heat, but regains its magnetic properties upon cooling again. Wrought iron, when pure, is malleable to a certain extent at

all temperatures; but it yields to the hammer with special readiness when heated to whiteness, and it may then be forged and welded without difficulty. The presence of any considerable proportion of sulphur or phosphorus makes the metal "short," or brittle. When phosphorus is present in too great a proportion, the iron is brittle in the cold (that is, "cold-short"); while if sulphur is present in excess it is brittle when hot (that is, it is "hot-short").

Chemically, iron is a dyad. It has the symbol Fe (from "ferrum," the Latin name for the metal), and an atomic weight of 56 if O=16, or 55.6 if H=1. It forms two basic oxids, (1) ferrous oxid, FeO , which gives rise to a series of salts known as "ferrous" salts, and (2) ferric oxid (or ferric sesquioxid), Fe_2O_3 , which gives rise to a corresponding series of "ferric" salts. A third oxid, having the formula Fe_3O_4 , is also known, which is magnetic, and occurs in nature, either amorphous or crystallized in octahedra, as the mineral "lodestone." This oxid is black in color, and is known as the black oxid, magnetic oxid, or ferroso-ferric oxid. It may be prepared, artificially, by oxidizing iron at a high temperature, either in air or in steam, or by heating carbonate of iron to 650° F., in a current of carbon dioxide. It is not readily attacked by acids or other chemical agents, and for this reason a coating of it is often formed on articles of iron to protect them from further oxidation. The Russian iron that is used for stove-pipes is coated in this way, by a secret process. When in mass, iron does not readily decompose water at ordinary temperatures, though it does so at high temperatures. Finely divided iron decomposes water at 212° F., and at lower temperatures according to some authorities. When in a sufficiently fine state of subdivision, iron will burn in the air or in oxygen, with the formation of a mixture of Fe_2O_3 and Fe_3O_4 . Iron forms alloys with many metals, and combines directly with chlorine, bromine, iodine, fluorine, sulphur, carbon, boron, silicon, phosphorus, and arsenic. Melted iron dissolves carbon to some extent, and when the molten mass is cooled the carbon is largely deposited in the graphitic form, although a part of it remains in the iron, combined with it in the form of a carbide; and it is believed that the presence of varying quantities of such carbides has much to do with the physical qualities of iron and steel. When melted iron that is saturated with carbon is allowed to cool under great pressure, the carbon is partly deposited in the form of minute crystals of diamond (q.v.); but the manufacture of the diamond by this method has not yet been made commercially practicable.

Ferrous Compounds.—Ferrous oxid, FeO , has not yet been prepared in a state of absolute purity, but it may be obtained approximately pure by reducing ferric oxid, Fe_2O_3 , by heating it to 600° F. in a stream of pure hydrogen. It is black in color, and absorbs oxygen with great readiness, passing into the higher oxids. Ferrous sulphate, otherwise known as protosulphate of iron, green vitriol, or copperas, is prepared by dissolving metallic iron in sulphuric acid, and crystallizing by evaporation. It has the formula $\text{FeSO}_4 + 7\text{H}_2\text{O}$, and is greenish in color. It is soluble in water, but the solution oxidizes readily, the salt becoming converted into ferric sulphate, $\text{Fe}_2(\text{SO}_4)_3$. Ferrous sulphate is largely used in the manufacture of certain black dyes,

IRON AGE—IRON AND STEEL INDUSTRY IN AMERICA

in the preparation of writing ink, and, to a certain extent, in photography. The ferrous oxalate developer, made by mixing a solution of ferrous sulphate with one of oxalate of potassium, was formerly in great favor, but has now fallen into comparative disuse, owing to the discovery of other developers that are more active and more convenient to handle. Ferrous chloride, FeCl_2 , may be prepared by heating excess of iron wire or iron filings in chlorine, or by passing dry hydrochloric acid gas over hot metallic iron. It crystallizes in white, lustrous, six-sided forms, and is volatile at a yellow heat. In air it oxidizes readily to a mixture of ferric oxide and ferric chloride. Ferrous carbonate, FeCO_3 , is an insoluble compound, occurring in nature as "spathose iron ore," and constituting a valuable ore of iron. Ferrous sulphide, FeS , is a black or grayish-black body, which may be prepared by melting sulphur and iron together in the proportion of 56 parts (by weight) of iron to 32 of sulphur. It is insoluble in water, but dissolves readily in dilute acids, with copious liberation of sulphuretted hydrogen gas. It is therefore greatly used in chemical laboratories, where this gas is extensively used for the separation of the metals. (See CHEMICAL ANALYSIS.)

Ferric Compounds.—Ferric oxide, Fe_2O_3 , occurs native as hematite (q.v.), and it may be prepared artificially by heating ferrous sulphate to redness. Ferric hydrate, $\text{Fe}(\text{OH})_3$, is precipitated as a brownish-red powder when ammonia or caustic potash is added to the solution of a ferric salt. Ferric sulphate and ferric chloride are prepared by dissolving this hydrate in sulphuric and hydrochloric acids, respectively. In general, a ferrous salt, when in solution, is converted into the corresponding ferric salt by the action of oxidizing agents; and the ferric salts, conversely, are reduced to ferrous salts by the action of certain reducing agents. Ferrous salts give a white precipitate with caustic alkalies, and, with potassium ferrocyanide, a light-blue precipitate which quickly turns black. Ferric salts give a reddish-brown precipitate with caustic alkalies, and a deep blue precipitate with potassium ferrocyanide. Iron is sometimes called "ferrosom" when it is present in a ferrous salt, and "ferricum" when present in a ferric salt. See IRON AND STEEL INDUSTRY IN AMERICA.

Iron Age, (1) in mythology, the last of the four great ages of the world, supposed to be characterized by abounding oppression, vice, and misery. (2) In archaeology, an age, the third in succession, in which weapons and many other implements began to be made of iron, stone having been used for these purposes in the first, and bronze in the second.

Iron and Steel Industry in America. Both the Assyrians and the Egyptians used implements of iron many centuries before the Christian Era. Iron and furnaces in which it was made are mentioned in the Pentateuch. The Greeks obtained their iron from the Chalybes, a nation on the south coast of the Black Sea. The Romans procured their iron from there, and also from Spain, Elba, and Styria. The iron mines of Elba, which to the present day yield a large amount of ore, were worked by the Etruscans, and the method employed by them for extracting the iron from its ores was

probably very similar to that now known as the Catalan forge process. Probably the aboriginal inhabitants of North America were unacquainted with the use of iron in any of its forms.

The iron of commerce is classified under three groups. These are "wrought iron," "steel," and "cast" or "pig iron." When a lump of pure and easily reducible iron ore is heated on a bed of ignited charcoal in a smelting-fire or forge it is readily reduced to a lump of metallic iron similar in shape to the mass of ore treated. If the lump be sufficiently large, one end may be hammered and drawn out into a bar or rod, while the other end remains in the fire as a mass of reduced or partly reduced ore. Such an operation represents the essential features of the primitive methods of iron smelting practised in the early colonial days of this country; the product thus obtained is known as wrought or malleable iron, whether it is made in the rude manner described or by the improved bloomeries which later replaced the rude old forge. From the bloomery, producing its soft malleable bar or bloom, the blast-furnace was gradually evolved, new metallurgical reactions were effected, and the product was obtained in a fluid condition, in which it could be run into simple sand receptacles, forming pig iron, or into specially constructed molds to produce castings for practical use. The metal thus obtained was hard, brittle, and possessed physical characteristics distinct from malleable iron. Since by the use of improved methods it became possible to obtain the product of the blast-furnace readily and with vastly greater economy, pig iron soon became, as it is at present, what the Germans call raw iron (*Roheisen*), from which practically every other variety of finished iron or steel is obtained. The ton of pig iron is therefore taken as the rough standard by which the world's production of iron is measured.

In the colonial period the British government systematically discouraged all efforts of the colonists to produce iron, in order to avoid competition with home industries. There were forges or bloomeries in nearly all the colonies from the times of earliest settlement, and as unlimited supplies of fuel were always at hand in the vast forests it was only necessary to find ore and obtain persons who could construct forges. The iron required for structural purposes, such as bars, straps, nails, sheets, etc., was obtained in the early days either by hammering the bloom from the forge or by shaping with rolls propelled by water-power. In fact, before the invention of the puddling process in England by Cort, in 1784, a large proportion of all forms of wrought iron were derived in this manner. The old so-called "Walloon" process of refining pig iron into the malleable or wrought form or into a crude mild steel was introduced into the colonies at an early date in their history. By the puddling process malleable iron is not directly produced from the ore, as in the older methods of manufacture, but indirectly from pig iron. The introduction of the puddling process was second in importance to no other invention in the history of the iron industry of this country. After the Revolution the iron industry developed steadily but slowly, probably owing to the fact that, as in colonial days, much, if not most, of the iron used along the seaboard was imported. No statistics of the production of iron were collected before the year 1810. The produc-

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tion of pig and cast iron in that year was 53,908 tons; wrought and malleable iron of all kinds, 27,105 tons; having a total value of \$6,081,374, of which amount Pennsylvania produced \$2,473,748. The product of the steel furnaces of Massachusetts, Rhode Island, New Jersey, Pennsylvania, Virginia and South Carolina in 1810 was 917 tons, valued at \$144,736; of the whole number of steel furnaces Pennsylvania contained five, producing 531 tons, valued at \$81,147. An analysis of these figures gives us some idea of the state of the industry at the beginning of the century. The product of the blast-furnaces — pig, or, as it was at that time termed, cast iron — was run directly into small castings then in demand for commercial purposes; the malleable iron was probably all derived directly from the ore in forges or bloomeries, whence it was taken to the rolling or slitting mills to be made into rods, bars, plates, nails, etc. The steel made at this period in the United States was probably all produced by the cementation or blister process, and was all of the grade now known as high-carbon or tool steel. Although Huntsman's improvement of this process, by which the steel bars thus made were fused in crucibles and subsequently cast into ingots, had been in operation in Sheffield, England, a number of years prior to 1810, it is doubtful if his invention had been adopted in the United States at this early date. In the census of 1820 the quantities of iron made are not given; their value, however, is stated as follows: Pig or cast iron, \$2,230,275; wrought iron, \$4,640,669; total, \$6,870,944. The 1830 census gave: Pig iron and castings, \$4,757,403; wrought iron, \$16,737,251; total, \$21,494,654. The production of iron steadily increased upon much the same lines as before and in 1840, 804 blast-furnaces produced only 286,903 tons of iron, and 795 bloomeries, forges, and rolling-mills only 197,233 tons of malleable or bar iron. For the first time in the history of the industry the production of cast or pig iron exceeded that from the bloomeries and forges. No figures are published for the value of the product in 1840, but if we assume the ton of pig iron to have cost \$30, and the ton of hammered bar iron \$90, we obtain \$8,607,090, or nearly double the value of pig and cast iron produced in 1830. The total value of the bar iron at this estimate would be \$17,750,970.

The high cost of manufacturing charcoal, and its enormous consumption in the furnace per ton of iron produced, were serious obstacles to the growth of the industry, even where a good supply of ore was well assured. As early as 1835 the adaptation of anthracite to the manufacture of iron began to attract attention, and Franklin Institute offered a gold medal "to the person who shall manufacture in the United States the greatest quantity of iron from ore during the year, using no other fuel than anthracite coal, the quantity to be not less than 20 tons." The medal was never awarded, but there is abundant evidence that from 1830 to 1840 a number of attempts to use mineral fuel in smelting iron ores were made. The first practically successful attempt to produce pig iron by the use of anthracite was made by David Thomas at Catasauqua, Pa. The furnace which he erected there for this purpose was blown in on 3 July 1840. It was equipped with a "hot blast" operated by water-power, and thus inaugurated in the

United States, two of the greatest innovations in blast-furnace practice. This furnace, producing from the start 50 tons of iron per week, continued in profitable operation until the year 1879, when it was dismantled. The early forms of hot-blast apparatus consisted of nests of iron pipes heated externally by separate fires, the object being to pass the air from the blowing- or blast-engine through these pipes, thereby greatly augmenting its temperature, and to decrease the consumption of fuel per ton of ore smelted. The hot blast was patented in 1828 by James B. Neilson of Glasgow, and its use is perhaps the most important improvement ever made in blast-furnace practice, for without it the present large and cheap production of pig-iron would have been impossible. Notwithstanding that the success in smelting iron in blast-furnaces with anthracite had been practically demonstrated in 1840, the general use of this fuel appears to have grown slowly; it was 10 or more years before the use of coal (either anthracite, coke, or a mixture of the two) became general. In 1846 the first furnace constructed with the intention of using raw bituminous coal as fuel was successfully placed in operation at Lowell, Mahoning County, Ohio. Although coke had been in general use in England for a number of years, it was not until 1837 that it was successfully used in the United States in the blast-furnace at Lonaconing, Allegany County, Md. The manufacture of Connellsville coke was commenced in 1841, but, according to Weeks, it was not until a number of years later, when railroad transportation had become more fully developed, that its value as a furnace fuel became thoroughly demonstrated. The period between the years 1840 and 1850 was a most eventful one in the history of the American iron industry. The introduction of the improvements in smelting already indicated, together with the use of steam-power for propelling the blast and in performing other varieties of work about the furnaces, its replacement of water-power in operating rolling-mills and hammers, in mining coal and ore, and the rapid growth of the railroads, produced a stimulating effect probably never before experienced in a similar degree by any American industry. The railroads contributed largely to the development of the iron industry in two ways: directly, by rendering transportation comparatively cheap, thereby enlarging the iron market and increasing the demand; and indirectly, by creating in their construction a new and unprecedentedly large consumption of iron. As the production of iron increased in later years, the older iron-ore deposits became exhausted, or were proved inferior to the newly discovered ore-beds of the Lake Superior region. The problem of suitably locating a modern blast-furnace producing from 9,000 to 10,000 tons of pig iron per month became a serious one, and its solution has had the effect of moving the geographical centre of the iron industry west of the Alleghany Mountains, nearer a new and larger ore supply, yet handy to the coke of Connellsville. In 1850 there were produced in the United States 563,755 tons of pig iron by 377 establishments, and wrought iron to the value of \$22,629,271 in 552 establishments.

The evolution of iron and steel plate making, particularly boiler-plates, forms an interesting chapter in the growth of our great industry.

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About 1815, when steam began to be used, Dr. Charles Lukens remodeled his mill to produce thicker plate. The bloom was reheated at the forge and hammered thin, usually about one and a half inches. It then went to the rolling-mill, where it was laid on a bed of coal in what was called a grate-furnace. After heating, it was rolled into plates one quarter and three sixteenths of an inch thick and sent to the boiler maker. But soon the mill began shearing into regular commercial sizes: 48 and 49 by 26 by one quarter or three sixteenths; or, if large enough, it was sheared into plates 68 and 69 by 26, and the scrap was cut into nails. But when the reverberatory furnace was introduced, the scrap was arranged into piles of such size as was necessary to produce the required plate, heated to a welding heat, and rolled in the mill. This state of things continued until the introduction of the puddling furnace. The most important advances made in the years between 1850 and 1860 were the invention of the "three-high" roll-train; the introduction of mills for rolling beams, by Cooper & Hewitt, at Trenton, N. J.; and the invention in 1848 of the "universal mill," by Daelin, a German engineer, which found its way to America 12 years later. In the manufacture of the finer qualities of steel, no progress was made up to 1860. According to the census of 1860, 97 establishments in the United States produced 51,290 tons of blooms, valued at \$2,623,178; 286 establishments produced 987,559 tons of pig iron, worth \$20,870,120; 256 establishments produced 513,213 tons of rolled iron, worth \$31,888,705; 13 establishments produced 11,838 tons of steel (probably of cheap grades), worth \$1,778,240.

During the Civil War the resources of the iron industry in the Northern States were taxed to their utmost. The industry in the South, strained at an early day beyond its feeble capacity, soon broke down, and most of the requirements of the Confederate armies were supplied from abroad. In the train of dire disaster wrought by the Civil War some good to the iron industry may be found; for not only did iron ships make their appearance in the navy, but the use of iron plates had its inception. As early as 1859 the French had built the frigate Gloire, armored with iron plates five inches in thickness, and in 1861 the British constructed the frigate Warrior, which was protected by solid iron plates four and a half inches thick. As regards armor, either of these vessels was much better protected than any of our monitors constructed during the Civil War, for the first monitor was protected by six to eight thicknesses of one-inch iron plates bolted one on the other with overlapping joints, and later vessels were probably protected in much the same way by armor made up of a greater number of similar one-inch plates.

In 1855 and 1856, Henry Bessemer, of London, had obtained patents for a process of converting molten pig iron into steel by forcing small jets of cold air through the molten iron; but his invention was not successful until modified by Robert F. Musket, who added to the molten steel, after the blast had been stopped, a sufficient quantity of spiegeleisen (an alloy of iron and manganese) to neutralize the oxide of iron caused by blowing and to give the steel the proper degree of hardness and fluidity.

Neither Bessemer nor his American rival, William Kelly, of Pittsburg, who secured a patent but did not utilize it, accomplished anything in America until 1866, when their interests were combined with Musket's and the first plant to produce the steel as a commercial article was put in successful operation by the Pennsylvania Steel Company at Steelton, near Harrisburg, Pa., June 1867. The first steel rails rolled in the United States in the way of regular business were rolled by the Cambria Iron Company, Johnstown, Pa., August 1867, from ingots made by the Pennsylvania Steel Company. The production of Bessemer steel in the year 1867 was 3,000 tons, the industry continuing to grow with rapid strides. In 1890, 4,131,535 tons were produced, in 1900 7,532,028 tons, and in 1902 9,138,363 tons. Of these amounts 2,550 tons were made into rails in 1867, 1,853,862 in 1890, 2,250,457 in 1900, and 2,935,392 tons in 1902. The importance of the invention of the Bessemer process to the world in general and the United States in particular cannot be overestimated, since it has reached a development with us greater than in any other country in the world. In 1901 the total amount of all varieties of steel made in the United States was 44 per cent of the entire world's product. The rapid and enormous development of the Bessemer-steel industry in the United States is attributable chiefly to the great extension of our railroads. Bessemer steel is also used for steel bars, merchant steel and for tin plates. The basic Bessemer or Thomas process though used in Germany to produce 4,888,054 tons in 1902, has not gained a foothold in this country.

The open-hearth steel process was first used in 1856, when the Siemens Brothers of London perfected what is now generally known as the Siemens regenerative gas-furnace, without which no open-hearth steel can be made. In 1864, Messrs. Emile and Pierre Martin, of the Sireuil works in France, erected, with the assistance of Dr. Siemens, one of the regenerative gas-furnaces to convert steel in an open-hearth or reverberatory furnace of their own construction. This scheme was a success from the start, and by a subsequent consolidation of the Siemens and Martin inventions a steel-making apparatus was devised, known as the Siemens-Martin or open-hearth process. This process was introduced into America in 1868 by F. J. Slade for Cooper, Hewitt & Company, at the works of the New Jersey Steel and Iron Company, at Trenton, N. J. In 1870 the production of open-hearth steel in the United States was 1,500 tons, and in 1890 574,820 tons, the industry showing a rapid development during the intervening 20 years. Great Britain was long the largest producer of open-hearth steel in the world, and in this branch of the iron industry the United States was somewhat behind its great rival, until 1900. In 1890 Great Britain produced 1,564,200 tons, as against 574,820 tons in the United States; in 1899 Great Britain produced 3,030,251 tons and the United States a little more than 2,000,000 tons; but in 1900 the figures are 3,398,135 tons for the United States (following James M. Swank, 'Iron and Steel at the Close of the 19th Century,' 1901; the census figures, always incomplete, are 3,044,356) and 3,156,050 for Great Britain. This growth is all the more striking when it is known that in 1895 the writer of this article hopefully

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prophesied that the production might reach in that year 1,000,000 tons. Five years later it had passed the 3,000,000-ton mark. The so-called "basic" open-hearth process, although in successful operation in Europe for a number of years, was not introduced into the United States until 1888, when a number of such furnaces were constructed at the works of Carnegie, Phipps & Company, at Homestead, near Pittsburgh, Pa. Without going into technicalities, the basic open-hearth process may be briefly defined as an ordinary open-hearth plant whose furnace lining is made of a basic material, such as dolomitic limestone or the mineral magnesite. When pig iron containing a sufficiently great quantity of phosphorus to render it unfit for conversion into steel by any other method is melted in such a furnace, the basic lining, together with a basic flux which is added, removes the objectionable phosphorus and renders (other conditions being normal), the resulting steel equal to that prepared in the open-hearth furnace in the old and usual manner. The purposes for which open-hearth steel is ordinarily adapted are quite different from those for which the Bessemer steel is most suitable; but the converse of this fact, however, is not true, since open-hearth steel may be and frequently is used to an equal, if not greater, advantage wherever Bessemer steel is employed. In this country, at least, all high-grade structural material, such as boiler and ship plate, bridge and building members, high-grade castings, etc., is almost invariably of open-hearth steel, which is generally considered, and doubtless is, more uniform in quality than soft steel made by the Bessemer method.

One of the most curious phases in the history of the American iron industry is the fact that although the United States at one time consumed nearly 60 per cent of the world's entire production of tinned plates, with the exception of a few sporadic attempts in 1873 and 1875, no tin or terne plates were made in the United States until 1891. Great Britain furnished virtually all the tin-plate used in the United States during the 20 years ending 1890. No better evidence of the success of our domestic tin-plate industry could be afforded than the fact that our imports have steadily decreased since 1889, those for 1890 being 29,435 tons, for 1894 215,068 tons, and for 1900 only 60,386 tons. The American production amounted to 999 tons in six months of 1891; to 6,092 tons in 1892; 44,503 tons in 1893; over 100,000 tons in 1895, and in 1900 to 302,065 tons. The census of 1900 reports 57 establishments manufacturing tin and terne-plate; gives their capital as \$6,650,047, its wage-earners as averaging 3,671, and their wages as \$1,889,917; and estimates the cost of materials at \$26,728,150, and the value of the product as \$31,892,011. In 1890 the industry was prac-

tically non-existent and was not reported in the census of that year.

If the history of the development of the American blast-furnace practice were written it would form a large book of itself. In 1870 most of the blast-furnaces in operation were still very primitive, and although no statistics for that year are given, it is probable that the best of them did not produce as an average over 50 tons of pig iron per day, whereas in 1902 the production of 300 tons per day was a common occurrence, and some furnaces regularly produced over 500 tons daily. The table at the bottom of the page taken from the United States census reports, exhibits the production of pig iron from 1870 to 1900.

These figures show the rapid fall in the number of establishments, resulting from the movement of concentration nowhere so strikingly shown as in the steel and iron industry. The capital invested has increased 150 per cent approximately in 30 years, the production nearly 700 per cent and the value of the product almost 200 per cent. During the 20 years between 1870 and 1890 production in the Middle States had nearly quadrupled, in the Western States increased nearly 5 times, and in the Southern States nearly 10 times. In 1890 the American product passed the record figures of the British furnaces, made in 1882. Between 1890 and 1895 the American trade suffered considerably and fell below the British in its total product; then it again advanced and is now 100 per cent greater than that of Great Britain.

The wonderful growth of the world's iron industry within 50 years is shown by the following tables, in metric tons (2,204 pounds).

COUNTRY	1854	Per cent	1902	Per cent
United States	750,000	12.5	18,003,448	40.7
Great Britain	3,000,000	59.0	8,653,970	19.5
Germany	400,000	6.6	8,402,660	19.0
France	750,000	12.5	2,427,427	5.5
Russia	200,000	3.3	2,566,000	5.8
Austria-Hungary	250,000	4.3	1,335,000	3.0
Other countries	650,000	10.8	2,869,480	6.5
Totals.....	6,000,000	100.0	44,257,991	100.0

Even more striking is the increase in steel output in the last 35 years, as shown below:

COUNTRY	1867	Per cent	1902	Per cent
United States	19,963	4.1	15,186,406	44.0
Great Britain	235,000	47.8	5,102,420	14.8
Germany	122,591	26.0	7,780,682	22.5
France	47,597	9.7	1,635,300	4.8
Russia	6,271	1.3	1,730,250	5.0
Austria-Hungary...	15,000	3.1	1,143,900	3.3
Other countries	35,000	7.1	1,900,825	5.6
Totals.....	491,422	100.0	34,479,783	100.0

PRODUCTION OF PIG IRON.

	1870	1880	1890	1900
Number of establishments.....	386	341	304	224
Capital	\$56,145,326	\$89,531,362	\$134,608,543	\$148,226,113
Wage earners.....	27,554	41,695	33,415	39,358
Total wages.....	\$12,475,250	\$12,665,428	\$14,614,458	\$18,500,462
Tons produced.....	1,832,876	3,375,912	8,845,185	14,452,234
Cost of materials.....	\$45,498,017	\$58,619,742	\$110,098,615	\$131,536,424
Value of product.....	\$69,640,498	\$89,315,569	\$145,643,153	\$206,823,202

IRON CITY—IRON IN MEDICINE

The total iron and steel exports and imports of the United States for the years 1890, 1900, and 1902 are shown below, the totals being long tons (2240 pounds).

YEAR	Exports	Imports	Excess
1890.....	45,687	603,749	Imp. 558,062
1900.....	1,154,284	209,955	Exp. 944,329
1902.....	370,805	1,212,839	Imp. 842,034

A sketch of the American iron industry would be incomplete without some reference to the introduction of the manufacture of armor-plate into the United States. This class of material not only has a peculiar and limited demand, but its manufacture requires the highest degree of metallurgical and mechanical skill, together with an exceptionally expensive plant. When the reconstruction of the United States navy was begun, some 20 years ago, we had absolutely no facilities for making the simplest kind of armor-plate, although we had some of the largest steel-works in the world. One of the first of the new armored vessels completed (the monitor *Miantonomoh*) was protected by "compound" plates imported from England. All the large forgings for the guns and shafts of the earlier ships were likewise imported. Owing to the policy of Congress, the Bethlehem Iron Company, and Carnegie, Phipps & Company, of Pittsburgh, were induced to erect expensive plants necessary for making not only the heavy gun-forgings required, but also for all the different grades and thicknesses of armor-plate. In 1891 these firms began to supply armor for the ships in course of construction, although at first their output of finished armor was extremely slow. The delays have now been slowly overcome, and at the present time there is little doubt that these great steel-works will be able to supply the armor as fast as new ships are constructed. How successful these works have been in furnishing our government with the best grades of armor-plate could have no better illustration than the fact that the Bethlehem Iron Company soon began supplying foreign governments with armor for their ships. The only two important iron and steel commodities which the iron industry of the United States did not supply in 1890 (tin-plate and armor-plate) are at present being made in large quantities, and the census for 1900 reports during the year 1900 15,302 tons of armor plate all produced in Pennsylvania, and valued at \$7,526,479. Vast improvement has been made in the machinery necessary to manipulate iron and steel. The Bethlehem Iron Company has a hammer of 125 tons' capacity, built by John Fritz and put into successful operation in 1891. But armor-plate is no longer rolled nor forged by hammers, but manufactured with huge hydraulic presses, some with an energy of 15,000 tons. George Fritz is the inventor of what is known as the "automatic tables," which with John Fritz's roll train enables the manufacturer to successfully handle almost any weight of ingot. I well remember when a 500-pound mass of iron was thought to be so heavy that the whole neighborhood gathered in to see it rolled. The necessity of handling such very heavy weights as could be made from ingots cast in large masses brought into play the invention of hy-

draulic machinery, so that we now have pumps to produce any required pressure in a series of pipes which deliver the water to the hydraulic engines in any part of the works. By simply turning a valve now a boy will pick up a heavy ingot (say of 10,000-pound weight) with his hydraulic crane and deliver it anywhere within reach of the crane. If on a car, it may then be taken by a small locomotive to the rolling-mill, where another crane picks it up and puts it into the furnace, and, after heating to the required degree, takes it out and delivers it to the machinery at the rolls; then the automatic tables push it back and forth through the rolls until it is reduced to the required dimensions. The same tables now take it to the shears, which are also operated by hydraulic power, and the plate, sometimes two inches thick, is sheared ready for shipment. All this is done with more ease than was possible a few years ago. Within the last few years electricity has been brought into play to do some of the heavy work.

CHARLES HUSTON.

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Iron City, a name given to Pittsburg, Pa., owing to its extensive iron industries. "Smoky City" is another name frequently applied to Pittsburg because of the large number of rolling-mills, furnaces, and foundries in which bituminous coal is used.

Iron Cross, a Prussian order, instituted by Frederick William III. in 1813, and conferred for distinguished services in war. The decoration consists of a Maltese cross of iron, edged with silver. The order was revived by William I. in 1870, on the eve of the great war with France. The grand cross, of double size, is presented exclusively for the gaining of a decisive battle.

Iron in Medicine. Iron was in use in medicine by the Chinese as early as 2700 B.C., and was employed in the treatment of anaemia much as it is administered to-day. In its native form, as iron, it is devoid of action, but when reduced to a salt, or oxide, capable of dissociation, it becomes active. Iron differs from many of the other heavy metals in that it is an active ingredient of the tissues, and is probably essential to the life of many if not all forms of living things. In the human blood it is an absolutely essential constituent, and its importance is great for all of the tissues of the body. In a number of the animals that lack red blood-corpuscles iron is not found abundantly in the blood, but is nevertheless present in large amounts in all parts of the body, and is perhaps just as essential for the chemical processes of nutrition as in higher vertebrates. It is well known that the presence of iron is necessary for the active processes of photosynthesis in plants, and that in its absence the higher plants are unable to develop chlorophyll, although chlorophyll itself does not contain iron in the form of haemoglobin. It is of interest, however, to note that Nencki, a Russian biologist, has shown that reduction compounds of haemoglobin and of chlorophyll are very closely allied, and he propounds the interesting speculation that probably the same iron compound was present in the living matter before a differentiation of animal and plant was made, and that as plants and animals developed along divergent lines of struc-

IRON MASK—IRON MOUNTAIN

ture the iron compounds became somewhat separated in their chemical character.

Iron combinations in medicine are usually divided into two classes, inorganic and organic. In the former the iron is dissociated in solution, and is usually acted upon by the hydrochloric acid of the gastric juice and converted into soluble chlorides, in which form it probably enters into the tissues. In the organic iron it is probable that the same conversion takes place, although there is much controversy regarding the method of its absorption; but this is true of all iron. The iron is usually taken up in the stomach and intestines, the larger part of it being rejected, and it enters into the blood in the form of an albuminate which passes into the duodenum, some being absorbed by the epithelium, and more or less of it carried directly to the spleen and probably to the liver. In the spleen it seems to undergo some changes, and is taken up by the blood and thereafter deposited more particularly in the liver and in the bone-marrow. When there is deficiency of iron in the blood or other organs, the liver gives up its store and it is absorbed by the tissue that is most in need of it. While in the blood, iron is the great organ of oxidation. By means of the haemoglobin the oxygen of the air is taken up and distributed to the different parts of the body. This permits of the active chemical oxidative changes that take place throughout the entire body, which changes are of such vital importance in general metabolism, and without which the body suffers, degenerates and dies.

Iron is used particularly for diseases in which the blood is poor in that metal. This is particularly the case in anaemias of primary and secondary character. In primary anaemia or chlorosis (q.v.), iron is a distinct help, often curing the condition. In primary pernicious anaemia, which is a grave blood-disease, it is of secondary value. In all of the secondary anaemias, those that follow hemorrhage, the acute infectious diseases, such as scarlet fever, malaria, whooping-cough, measles, typhoid, pneumonia, etc., iron is of great service. It is particularly valuable following childbirth or any condition in which there has been a great loss of blood. It is also useful in conditions of scanty menstruation, in tuberculosis, and is one of the best general tonics in the realm of medicine. The effects of inorganic and iron solutions on the teeth should be borne in mind, although they are much exaggerated. Iron is apt to cause a certain amount of constipation, but this, by proper laxatives regularly taken, should be overcome.

Iron Mask, The Man with the, a famous personage who was kept a prisoner in two or three French prisons in the time of Louis XIV., and who excited a curiosity corresponding to the care with which his identity was concealed. His first prison was the castle of Pignerol, of which Saint-Mars was governor. In 1686 he was carried by Saint-Mars to the isles of St. Marguerite; and the same precautions were observed as upon his first journey. Saint-Mars having been appointed governor of the Bastile in 1698, carried the prisoner with him there, but still masked. An apartment had been prepared for him more convenient, and furnished with more care than those of the other unfortunate beings who inhabited this sad abode. He was not permitted to take off his mask even before

his physician. In other respects the greatest attention was shown him, and nothing which he requested was refused him. His education appeared to have been carefully attended to; and he amused his leisure by reading, and playing upon the guitar. This unknown person died 19 Nov. 1703, at 10 o'clock in the evening, without having undergone any severe sickness. He was buried the next day in the afternoon in the cemetery of the church of St. Paul. He was, it was said, about 60 years of age, although the register of burials for the church of St. Paul, in which he is mentioned under the name of Marchiali, makes him only about 45. It is said that orders were given to burn everything which had been employed in his service; that the walls of the chamber which he had occupied were rubbed down and whitewashed; and that the precautions were carried so far, that the tiles of his room were removed, in the fear that he might have displaced some of them to conceal a letter behind them. Conjecture exhausted itself to discover who this mysterious personage might be.

At the time of the destruction of the Bastile, in July 1789, there were not wanting curious persons, who sought, in the archives of this fortress, to discover some notices which might throw light upon this historical problem. But to no purpose. A widely-accepted conjecture was first thrown out in a letter written in 1770 by Baron D'Heiss to the 'Journal Encyclopédique.' According to this view the Man with the Iron Mask was Count Girolamo Magni, or Mattioli, first minister of the Duke of Mantua, who had betrayed the interests of Louis XIV. by failing to secure for him, as he had pledged himself to do, in consideration of a large bribe, possession from his master of the fortress of Casale. For this offense he was lured to the French frontier, secretly arrested, and imprisoned in the fortress of Pignerol in 1679. The secret was preserved so carefully, on the supposition that Mattioli was the prisoner, because his seizure and detention were flagrant violations of international law. In a more recent investigation by M. Jung, 'La Vérité sur le Masque de Fer' (1873), an attempt is made to identify the Mask with a gentleman of Lorraine, who was connected with an association for the assassination of Louis. Funck-Brentano in 1894 revived the view that Mattioli was the mysterious prisoner, and many now consider the controversy settled and this view established. Consult: Hopkins, 'The Man in the Iron Mask.'

Iron Mountain, Mich., city, county-seat of Dickinson County; on the Chicago, M. & St. P. and the Chicago N. W. R.R.'s; about 47 miles southwest of Marquette and 57 miles west by north of Escanaba. It was settled in 1879 and chartered in 1888. It is the commercial centre for a large mining section in Michigan and for a farming section in Wisconsin. Its chief manufactures are mining and agricultural implements, and its trade is principally in iron-ore and farm products. Pop. (1900) 9,242.

Iron Mountain, the southern spur of the St. Francois Mountains, a low range in the eastern part of Missouri. This mountain, which is really a hill or knob, is in St. Francois County, about 60 miles southwest from St. Genevieve, the nearest point on the Mississippi River. It is about 300 feet above the surrounding land and

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about 2,000 feet above the sea. It covers an area of 500 acres. It is famous for its remarkable mineral deposits, specular or hematite iron-ore, the purest iron ore in the United States. The average elevation above the land around is 550 feet, and the area it covers is about 500 acres. Large oak trees flourish on its slope, their roots embedded in soil composed largely of fragments of peroxide of iron. Excavations were begun in 1845. An artesian well has been sunk to the depth of 152 feet, with the result that the beds passed through from the surface were as follows: Iron ore mixed with clay, 16 feet; sandstone, 34 feet; magnesian limestone, $7\frac{1}{2}$ inches; gray sandstone, $7\frac{1}{2}$ inches; hard blue rock, 37 feet; pure iron ore 5 feet; porphyritic rock, 7 feet; iron ore 50 feet to the bottom. It would seem that nearly the whole mountain was a mass of magnetic iron ore. The adjacent valleys are underlaid with magnesian limestone in horizontal strata. Pilot Knob (q.v.), about six miles south of Iron Mountain, also contains an extensive deposit of iron ore; Shepherd Mountain, a short distance southwest of Pilot Knob, is the largest of the iron mountains in that immediate vicinity.

Iron Ores. Although iron is the most abundant of the useful metals, forming 5 per cent of the earth's crust, it is rarely found native—one famous native occurrence of it, however, being at Ovifik on the west coast of Greenland. The iron ores of chief commercial importance are hematite, magnetite, limonite, siderite and pyrite. Pure hematite contains 70 per cent iron; magnetite 72.4 per cent; limonite 59.89 per cent; siderite 48.27 per cent; pyrite 46.6 per cent. Iron ores, however, are practically never mined pure, but are mined in quantity averaging 10 per cent and over less iron than above stated, the principal impurities being silica, alumina, and lime.

Hematite, ferric oxide (Fe_2O_3), by far the most important iron ore, varies greatly in physical characteristics. Specular hematite is black, with a brilliant metallic lustre. Martite is a variety of hematite. Magnetite, a ferro-ferric oxide ($FeO.Fe_2O_3$), is black magnetic, and crystallizes in octahedra, but as mined it is usually massive or granular. Ilmenite, an oxide of iron and titanium, is not yet an ore of commercial importance. Franklinite, an oxide of iron, manganese, and zinc, found at Franklin, N. J., is used in making spiegeleisen, an alloy of iron and manganese after the zinc has been removed by roasting. Limonite or brown hematite, hydrated ferric oxide ($2Fe_2O_3 \cdot 3H_2O$), is brown or yellow in color and occurs in massive, earthy, or in botryoidal forms. Bog-ore is a variety of limonite. Goethite, differing from limonite in crystalline form and containing less water, is found in large quantities in Minnesota. Siderite, or spathic iron, ferrous carbonate ($FeCO_3$), is white to gray when pure, and crystallizes in rhombohedra. As mined, it varies much in appearance, owing to oxidation. Clay iron stone is siderite mingled with clay. Blackband ore is siderite mixed with more or less bituminous matter. Pyrites, ferric disulphide (FeS_2), often called "fool's gold," is used in great quantities to make sulphuric acid. The residue, known as "blue-billy," or pyrites clinker, is in some countries smelted in the blast-furnace as an iron ore.

In smelting an ore the silica, lime, and alu-

mina are removed as slag. Ores high in silica require more limestone in the furnace-charge for fluxing, that is, for combining with the silica. Some ores contain silica and lime in such proportions as to be self-fluxing. The higher the iron content of an ore, generally speaking, the greater the yield per ton of material put through the furnace, and the lower the cost per ton of the iron made.

A very hard ore must be broken into small lumps to give best results in the furnace. Hematites often smelt easier than magnetites. A fine granular ore makes trouble in smelting, and a certain proportion may be lost as dust, which clogs furnace-flues. The really injurious impurities most often found in iron ores are sulphur, phosphorus, and titanium. Sulphur can be largely removed by roasting the ore before smelting; phosphorus cannot, and all the phosphorus in the ore goes into the iron. For making steel by the Bessemer process an ore should contain less than 1-1,000 of its amount of iron; thus, to be classified as Bessemer, an ore containing 61 per cent iron should contain less than .061 per cent phosphorus. For making steel by the basic process, high phosphorus ores are used.

The present development of the world's iron mines is the outcome of many factors. Generally speaking, it is cheaper to bring the ore to the fuel than the fuel to the ore, hence, countries or districts that have great supplies of iron ore may be insignificant producers of pig-iron. Low-priced fuel has been the chief factor in determining the location of iron and steel industries, while the chief factors in the development of iron mines are the quality of the ore and the cost at which it can be put down at the furnace.

Iron-Ore Supplies of the World.—The iron industry in Asia is several thousand years old, but the annual output of iron ore is small. China has vast but little-developed deposits of limonite and hematite. Japan is very poor in iron ores. The iron industry of Australia is not of importance. The only ores exported from Africa are mined in Algeria, where the annual production has fallen to about 150,000 tons. Europe has famous ore fields. The ores of Elba and those of Styria were worked by the Romans. Certain Swedish mines have been worked almost continuously since 1300. The German output now comes chiefly from so-called minette beds of Lorraine and Luxemburg. The ore, a low-grade limonite high in phosphorus, is used in making steel by the basic process, and the present annual output is over 7,000,000 tons annually. The total ore supply left in the field is estimated at nearly 2,000,000,000 tons. The iron fields of Great Britain have passed their greatest productiveness. The principal districts are Cleveland in North Yorkshire, yielding clay ironstone containing about 30 per cent iron; Cumberland and Lancashire, yielding red hematite containing 50 to 60 per cent iron; and Lincolnshire, Leicestershire, and Northampton, yielding cheaply-mined low-grade hematite. The blackband ores of Scotland are of much less importance than formerly. The principal Spanish mines are in the Bilbao district in the province of Biscay, the productive field being 15 miles long and $2\frac{1}{2}$ wide. The ores are red and purple hematite, limonite, and carbonate, the iron content in the crude ores running from 45 to 56 per cent. The district has produced to date about 95,000,000 tons. The greater part of the

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Russian ore supply comes from the Ural Mountains, the ores on the east side of the range being magnetite, and on the west side limonite and carbonate. Near Krivoi Rog, in the Caucasus, are mines of hematite and magnetite. Fully 80 per cent of the iron ore of France is obtained from the minette beds of the Moselle that extend into Lorraine and Luxembourg. Most of the French ores are limonites. The principal Austrian iron mines are in Styria, the Styrian Erzberg having one of the largest deposits of siderite in Europe, yielding yearly about 1,000,000 tons of carbonate ore, containing 40 per cent of iron. In Bohemia are mines of magnetite, limonite, and siderite. Sweden has immense deposits of iron ore, chiefly magnetite with some specular hematite. The most important deposits are at Grangsberg in Central Sweden, where are specular hematite and magnetite ores containing 62 to 64 per cent iron and 0.9 to 1.5 per cent phosphorus, and at Gellivare, 100 miles from the Gulf of Bothnia, where are huge bodies of magnetite that run from 68.69 iron and 0.05 phosphorus to 60 per cent iron and 1.5 per cent phosphorus. The ores from this field and the neighboring districts of Kurunavaara and Luossavara will be of great importance to British iron-masters, and shipments to the Atlantic seaboard of the United States are quite possible.

WORLD'S PRODUCTION OF IRON ORE — METRIC TONS.

United States	29,350,325	37.7
Germany	16,570,182	21.4
Great Britain	12,475,700	16.1
Russia	6,700,000	8.6
France	4,260,747	5.5
Austria-Hungary	3,623,115	4.7
Sweden	2,793,566	3.6
Other countries	1,800,000	2.4
Total	77,573,635	100.0

The total production was undoubtedly larger, since among the "other countries" are those that collect no returns of mineral output. The figures are for 1901 or 1902.

The iron ore supplies of South America have been little developed, and those of Mexico are just coming into prominence. In the province of Santiago, Cuba, are deposits of high-grade hematite. From there over 690,000 tons were exported to the United States in 1902. At Belle Isle, N. F., beds of hematite are now worked on a large scale. In Ontario, Quebec, and British Columbia are deposits of good hematite and magnetite, and the Dominion will soon be a large producer. There is a possibility of iron ores being mined in Labrador.

The United States leads the world in the production of iron ore. The ores mined range from low grade limonite to the highest grade hematites and magnetites. The purest ore ever mined in the United States in quantity was probably the magnetite from the Lovers Pit at Mineville, N. Y., which ran 72 per cent iron in

carload lots, though the Lake Angeline mine at Ishpeming, Mich., has shipped hard hematite running 68 per cent iron and 0.008 phosphorus in thousand-ton lots. Minnesota now leads the States in production, with Michigan second, Alabama third, and Pennsylvania fourth. The chief centre of iron-ore production is about Lake Superior, where the ores occur along five mineral belts or "ranges," in Pre-Cambrian rocks. The Marquette range, in Michigan, was opened in 1856; the Menominee, mostly in Michigan, but partly in Wisconsin, in 1887; the Gogebic, in Michigan and Wisconsin, in 1884; the Vermilion, in Minnesota, in 1884; and the Mesabi, in Minnesota, in 1892. The ores shipped are nearly all red hematite. The Marquette produces some magnetite. As much of the ore is hauled long distances to a furnace, 60 per cent iron was once about as low grade ore as could be shipped profitably, but now some mines ship Bessemer ores containing but 45 per cent iron. The ore-bodies are sometimes of great size. The Chapin mine, on the Menominee range, is working lenses 100 feet wide and 600 feet thick in the middle, and 2,500 feet long. The Fayal mine, on the Mesabi range, in 1902 shipped 1,681,000 tons, and the Chapin in the same year 927,747 tons. The Mesabi deposits are flat-lying, covered by a varying depth of clay, sand, and boulders. By stripping off the surface and working the granular ore with steam-shovels, an enormous output is possible. The output of the various ranges in 1902 was: Mesabi, 13,342,840 long tons; Menominee, 4,627,524; Marquette, 3,853,010; Gogebic, 3,663,484; Vermilion, 2,084,263; making a total of 27,571,121 long tons.

In the South there are three important iron-mining centres—one near Birmingham, Ala., another in southeastern Tennessee, and the third in southwestern Virginia. The ores are red hematites and low-grade limonites. The growth of the Alabama industry is due to cheap ore, limestone and coking-coal being found in close proximity. Pennsylvania leads the Union in the production of magnetite, chiefly from the great ore-body at Cornwall, and also produces much limonite. New York and New Jersey also produce magnetite, and the former State some red hematite. Carbonate ores now come chiefly from Ohio. Of the western States, Colorado produces limonite, and in Utah and Wyoming are great deposits of magnetite and hematite, destined to be of importance in the near future. The famous specular hematite mines at Pilot Knob and Iron Mountain, Mo., are exhausted. Texas has large deposits of ore, and several other States are or will be important producers.

Mining and Handling Iron Ores.—Some extraordinary records of cheap mining and transportation have been made in the Lake Superior iron-ore trade. Large ore-bodies, effi-

UNITED STATES IRON ORE PRODUCTION — IN LONG TONS.

	1880	1890	1900	1902
Lake Superior	1,985,334	7,558,076	19,095,393	27,571,121
Southern States	627,517	2,904,322	5,100,000	4,850,000
Other States	4,884,658	4,056,469	1,758,000	2,215,000
Total	7,497,509	14,518,867	25,953,393	34,636,121

IRON SKELETON CONSTRUCTION — IRONWEED

cient labor, and excellent management have been the factors in reducing mining costs, while the long lake-water haul, nearly 900 miles, in specially designed vessels, has made it possible to put down Lake Superior ores at Pittsburg, over 1,100 miles from the mine, at a total transportation cost of under \$2 per ton. On the Mesabi range, in some large mines steam-shovels load the ore directly upon the cars, one shovel having loaded 170,000 tons in 26 days, or at the rate of over 6,500 tons per day. The shovels are each operated by five men, and the labor cost for mining and loading averages but about 16c per ton, and at one mine which dug and loaded 293,651 tons in 174 days, the labor cost was only 4c per ton. The loaded ore-trains go 50 to 115 miles to a shipping port. There they are run on to long, high docks having large pockets or bins into which the ore runs through openings in the bottoms of the cars. From these pockets the ore passes by gravity down along chutes into the hold of the vessel, so that no hand-labor is required. The ore-pockets hold about 160 tons each, and number from 90 to 384, according to the length of the dock.

In unloading the ore from the vessels, the use of labor-saving machinery is even more notable. A series of steel bridges, easily moved along the docks, is supplied with hinged arms which can be lowered into the hatch of the vessel. Along each arm and across the bridge runs a trolley-train to which are attached automatic grabs similar to a double scoop. The grab or scoop holds about five tons of ore, and when it begins to draw together it digs into the ore. The grabs can remove over half of the cargo without any assistance, and the remaining half is brought directly under the hatch by use of a scraper, operated by similar machinery. The grabs are so controlled by the engineer that he can drop them at any point over the hold he may wish, and after a grab seizes its load of ore it is raised at full speed, carried rapidly along the trolley to any given point, and dumped into railroad cars or on stock piles. This 5-ton grab has a hoisting speed of 100 ft. a minute, and can run along the bridge at the rate of 1,000 ft. a minute. The bridges to which the arms with their grabs are attached are worked by electricity. By such a device 26 men can do the work of 300 under the old system. Another unloading device, the Hulett unloader, requires even fewer men, and takes out a larger proportion of the cargo without aid.

Bibliography.—Owing to the enormous growth of the iron industry, there is no recent single work covering the production and use of iron ores. Statistics of production can be found in 'The Mineral Industry,' the 'Mineral Resources of the United States,' and the 'Engineering and Mining Journal.' Descriptions of geological occurrence and mining methods can be found in the monographs and bulletins of the United States Geological Survey; and the 'Transactions' of the American Institute of Mining Engineers. See **GOETHITE**; **HEMATITE**; **ILMENITE**; **LIMONITE**; **MAGNETITE**; **MINING**; **ORE DEPOSITS**. **SAMUEL SANFORD**, *Assoc. Editor 'Engineering and Mining Journal.'*

Iron Skeleton Construction, a modern system of constructing high buildings, by which

architects and builders are enabled to plan and erect buildings as high as 15 or 20 stories on plots of ground 20 to 30 feet wide. By the use of this system the thickness of walls is considerably reduced, thus giving a larger floor space, a very desirable consideration, especially in office buildings. Iron and steel columns are carried up from foundation to roof, and then covered in with bricks or stone. Thus a carrying capacity equal to that of walls of much greater thickness is produced. A 12-story building in New York city thus constructed upon a lot 25 by 100 feet means a saving in floor space of thousands of feet.

Ironclad. See **ARMOR-PLATE**.

Ironclad Oath, The, an act passed by the United States Congress in 1866, excluding voters, in the States lately in rebellion, from the franchise. The act practically disfranchised all Southerners over 25 years of age. It was repealed shortly after its passage.

Irondale, i'rн-däl, Wash., a place in the northeastern part of Jefferson County, a few miles south of Port Townsend. The first blast-furnace on the Pacific coast was erected at this place in about 1880. The furnace was in operation about 12 years, and was then abandoned because of the great expenses incurred in production. The ore was obtained from Texada, an island belonging to British Columbia, and 130 miles distant. The last of the 19th century the Pacific Steel Company, a corporation in which practical iron-makers of Pennsylvania are the chief owners, began investigations as to the nature of the ore, and the possibility with improved machinery, to manufacture iron at Irondale or vicinity at paying rates. As a result the Pacific Steel Company have taken up the work abandoned by the Puget Sound Iron Company. The works have been so improved as to be practically new, and 20 brick charcoal kilns have been erected for the use of the company. Coke is obtained in Washington.

Ironton, i'rн-tôn, Ohio, city, county-seat of Lawrence County; on the Ohio River, and on the Detroit S., the Norfolk & W., and the Cincinnati, H. & D. R.R.'s; about 100 miles directly southeast of Columbus. The Chesapeake & Ohio railroad, in Kentucky, has here a ferry for passengers and freight, which practically gives the city the benefit of four important railroads. Ironton was settled in 1832, and for some years was known as a river-trading town. It was incorporated in 1849. It is situated in a section of country noted for its clay (suitable for pottery), iron ore, and bituminous coal. Its chief industrial establishments are foundries, rolling-mills, blast-furnaces, machine-shops, nail-works, furniture factories, and planing-mills. It has also among its manufactures doors and mantels, stoves, boilers, cement, and fire-bricks. The clay in the vicinity is much used for pottery. The parks, River View, Lincoln, and Beechwood, are attractive. Some of the principal buildings are the Briggs Public Library, the Kingsbury school, Odd Fellows' Hall, Masonic Temple, City hospital, and several churches. Ironton was the home for some time of the artist Sarah Cotter-King. Pop. (1900) 11,868.

Ironweed, a tall, coarse, composite plant of the genus *Vernonia*, three species of which

IRONWOOD—IRRIGATION

grow abundantly in woods and along roadsides throughout the southern half of the Union, bearing heads of magenta-colored flowers somewhat like miniature thistles. The most conspicuous species (*V. gigantea*) is often 10 feet high, and blooms in August and September. A similar species (*V. noveboracensis*) grows in low grounds throughout the northern States.

Ironwood, Mich., city in Gogebic County, on the Wisconsin C., and the Chicago & N. W. R.R.'s; about 12 miles south of Lake Superior and 33 miles southeast of Ashland. It was settled in 1884 and incorporated in 1887. It is situated in a region rich in iron ore and timber; the section is known as the "Gogebic iron region." The famous Norrie mine is in this vicinity. Ironwood is the trade centre for the greater part of the mining and lumbering business of the county. Some of the principal buildings are the Carnegie library, the city-hall, the high school, and several churches. Trolley lines connect the city with Gile and Hurley, Wis. The government is vested in a mayor, who is elected annually, and a council. The mayor appoints, subject to the approval of the council, all the subordinate officials except the members of the board of education. Pop. (1890) 7,745; (1900) 9,705.

Ironwood, a popular name for many trees whose timber is very hard and heavy. Probably the best known species in America is also known as leverwood, *Ostrya Virginica* of the natural order *Cupulifera*, indigenous from Nova Scotia to Florida and westward to Minnesota and Texas. It is a medium sized tree with furrowed bark, birch-like foliage, pistillate flowers in catkins resembling the female flowers of hop, hence its popular name hop-hornbeam. The name ironwood is also sometimes applied to *Carpinus Americana* or *Caroliniana*, of the same natural order. (See HORNBEAM.) Among foreign "ironwoods," perhaps the most widely known is *Mesus fere*, an East Indian tree planted around Buddhist temples for its fragrant flowers, which are used to decorate the images of Buddha. Another Asiatic species is *Metrosideros vera*, from which the Chinese and Japanese make rubbers. In Australia and South Africa various species of *Olea*, *Melaleuca*, *Sideroxylon*, *Notelaca*, and *Myrtus* are valued for their timber, locally called ironwood, employed where great toughness is desirable and weight no obstacle.

Iroquois, *ir-ō-kwoi'*, the name given by the French to the confederacy of North American Indians, called by the English the "Five," and afterward the "Six Nations." The Mohawks, Oneidas, Onondagas, Cayugas, Senecas, and Tuscaroras, after they were driven from their hunting-grounds in North Carolina in 1712, were the members of this confederacy. They formerly resided on the Mohawk River in New York State and on the lakes which still bear their names, and extended their conquests to the Mississippi and beyond the St. Lawrence. Their valor and successes had procured them the name of the Romans of America. Their territory abounded with lakes well stored with fish; their forests were filled with game, and they had the advantage of a fertile soil. The sachems owed their authority to public opinion; the general affairs of the confederacy were man-

aged by a great council, composed of the chiefs, which assembled annually at Onondaga. They exterminated the Eries, drove out the Hurons and Ottawas, subdued the Illinois, Miamis, Algonquins, Lenni Lenape, Shawanese, and the terror of their arms extended over a great part of Canada, and the northern and northeastern parts of the United States. It is probable that, had America not been colonized by the whites, they would have absorbed all the nations from Canada to the Gulf of Mexico. In the long wars between the British and French, which continued with some interruptions for nearly a century, until 1763, they were generally on the British interest; and in the Revolutionary War they were also mostly in favor of the British. According to the United States census, and a Canadian report, the total number of the Iroquois in 1902 was about 17,000, of whom about 8,000 were in the United States. See SIX NATIONS, THE.

Irrawad'y. See IRAWADI.

Irrigation, the watering of land by artificial means to make it productive. Historically, irrigation seems coeval with the earliest attempts to construct complicated machinery, and the systems of irrigation used in the earliest times in the Far East, in Babylonia, and in Egypt, dating in the last-named country 20 centuries before Christ, furnish as important a chapter in the history of invention as in the story of agricultural development. In our times the systems of India (q.v.) and Egypt (see ASSOUMAN; NILE) are probably the best organized, being largely under governmental control. In Europe, irrigation is widely used in northern Italy, southern France, and throughout Spain. The British colonial possessions of the southern hemisphere, notably Australia and South Africa, benefit more and more by artificial water-supply.

Early Irrigation in America.—Irrigation was practised in prehistoric times by the town-building Pueblo Indian tribes inhabiting portions of New Mexico and Arizona. The descendants of these Indians still utilize some of the lands which were tilled by irrigation at the time when the Spaniards first came from the south, and practise many of the primitive customs of their ancestors. The Mexicans of mixed Spanish and Indian origin, gradually extending their settlements from the south, through necessity practised irrigation. The early missions of the Pacific coast also used it, and in southern California particularly are to be found the ruins of substantial dams and headworks built of masonry and constructed by Indian labor. But the first systematic application of irrigation in the arid West by English-speaking people was made by the Mormons on the shores of the Great Salt Lake. The soil was so barren that crops could not be raised by ordinary means, and they turned the waters of the little cañon streams upon the ground where Salt Lake City now stands. After many years they succeeded in mastering the art of irrigation, and under the wise rules of Brigham Young, limiting the size of irrigated farms, the Mormons have become a prosperous people. At about the time the Mormons were settling Utah, the gold-miners in California were building ditches for placer-washing, and were using water from these ditches for irrigation. The results obtained attracted public attention, and irrigation slowly

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developed as an adjunct to mining. With the stoppage of hydraulic mining, the ditches built for mining were either abandoned or used exclusively for irrigation. Many of them have been enlarged, and have now even greater value than in the old days of mining excitement.

Development in the United States.—The successful irrigation attained by the Greeley colony in Colorado, and the wonderful results shown by the Mormon communities in Utah, Idaho, and Arizona greatly stimulated the colony idea; many organizations brought people in large bodies from the Eastern States, and even from Europe, and placed them on small farms located near each other and supplied with water from a common ditch. Individual settlers also sought opportunities for bringing land under cultivation by artificial watering; and thus, at many widely scattered points, irrigation has been introduced. There are no statistics concerning the area irrigated in 1870, but it is probable that in that year there were not over 20,000 acres under irrigation in the whole United States; but 1870-80 saw a rapid development of small ditches, constructed by individuals and associations of farmers. At the end of that period there were probably 1,000,000 acres under irrigation. In the decade 1880-90 occurred the "boom" of speculative enterprise in irrigation canals. Large sums of money were obtained for irrigation works, but nearly all of these failed, and although they aided in the extension of irrigation, they did not enrich the investors. The 11th census showed that in 1889 there were 3,631,381 acres irrigated on 54,136 farms, with an average irrigation area of 67 acres. During the following decade the irrigated acreage doubled in extent. This was due to the extension and enlargement of the many canals existing in 1880, and to the more complete practice of irrigation on the lands under ditch.

In addition to the statistics obtained at the Eleventh (1889), and Twelfth (1899) Censuses, a special investigation was ordered in 1902 of irrigated farms and extent of irrigation in acres in the principal arid States, and also the total in the semiarid States, namely, North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. These lie east of the truly arid region but extend in parts into regions of deficient rainfall.

NUMBER OF IRRIGATED FARMS.

States	1902	1899	1889
Arizona	3,867	2,981	1,075
California	29,255	25,611	13,732
Colorado	19,088	17,613	9,059
Idaho	10,077	8,987	4,323
Montana	9,496	8,043	3,706
Nevada	2,260	1,906	1,167
New Mexico	9,314	7,884	3,085
Oregon	5,133	4,636	3,150
Utah	21,018	17,924	9,724
Washington	4,585	3,513	1,046
Wyoming	3,721	3,721	1,917
Semiarid States	6,994	4,970	1,552
Total	126,008	107,789	54,136

ACRES IRRIGATED.

States	1902	1899	1889
Arizona	247,249	185,396	65,821
California	1,708,720	1,445,872	1,004,233
Colorado	1,747,332	1,611,271	890,735
Idaho	713,395	602,568	217,005
Montana	1,140,694	951,154	350,582
Nevada	570,001	504,168	224,403
New Mexico	254,945	203,893	91,745

States	1902	1899	1889
Oregon	439,981	388,310	177,944
Utah	711,184	629,293	263,473
Washington	154,562	135,470	48,799
Wyoming	773,111	605,878	229,676
Semiarid States	572,751	273,117	66,963
Total	9,034,526	7,536,390	3,631,381

National Irrigation Act.—The latest and most important step in American irrigation is marked by the National Irrigation Act, which was passed by Congress in 1902, and received the countenance of President Roosevelt. The act provides for the construction of irrigating works under the control of the secretary of the interior, the funds being derived from the disposal of public lands in the 13 States and 3 Territories. The public land is withdrawn from entry excepting under the Homestead Act. The holdings when reclaimed are to be restricted to between 40 and 160 acres, the area being limited to the acreage which in the opinion of the Secretary may be reasonably required for the support of a family. The cost of the reclamation works is to be apportioned to the reclaimed lands and is to be refunded in not exceeding 10 annual installments, the charges being determined with a view of returning to the Reclamation Fund the estimated cost of construction. For land in private ownership no right to the use of water shall be sold for tract exceeding 160 acres to any one landowner, and he must be an actual resident on or near the land. The result of the law is to give free land under the terms of the Homestead Law and supply water at cost from permanent systems without charging profit or interest to the settler. The management and operation of the irrigation works will ultimately pass to the owners of the lands to be maintained under such rules as may be acceptable to the Secretary, the title and operation of the reservoirs and similar works remaining in the government. It is believed that during each 10 years for the next third of a century an acreage equal to the total now under irrigation in all the West may be added to the agricultural area of the 16 States and Territories affected; thus rapidly multiplying production, furnishing new homes for millions, and providing the food products needed for shipment from the Pacific coast for use in the lands across the Pacific where new markets are now being opened for the surplus products of this country.

Upon the passage of the Reclamation Law in 1902, examinations and surveys were begun in the arid States and construction started in Arizona and Nevada. In Arizona flood water is to be stored on Salt River by a dam below the mouth of Tonto Creek, furnishing a supply for arid lands in the vicinity of Phoenix. In Nevada the flood water of Truckee River is to be diverted by a canal under construction taking it to Carson River, storage being there provided for the excess water of both streams. This will be used upon the desert area in the vicinity of Carson Lake. Other principal projects favorably reported upon are Colorado River in Arizona and California; Gunnison River in Colorado; Snake River in Idaho; Milk River in Montana; North Platte River in Nebraska; Rio Grande and Pecos rivers in New Mexico; Yellowstone River in North Dakota; Umatilla River in Oregon; Belle Fourche in South Dakota; Bear Lake in Utah; Palouse River in Washington, and Shoshone River in Wyoming.

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1. Scene in Southern California, showing the furrow method of irrigation.
2. Desert land reclaimed by irrigation, showing recently planted orchards.

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Surface streams supply over 90 per cent of the irrigated land of the United States. Streams within the arid region of the United States rise high, and at one point or another flow for a time through upper valleys or parks. But after passing through rocky defiles to a fertile lower valley, the typical stream of the arid West loses itself in a shallow sandy channel.

Water-Supply and Regulation.—The water used in irrigation is for the most part taken from the river or creek by natural flow or gravity. The cost of lifting or pumping water is usually too great in proportion to the value of crops raised to permit the general use of pumps. Water will flow rapidly in a ditch having a fall of two feet per mile, and the stream supplying the ditch may be falling at a rate of 12 feet per mile. At the end of the first mile the water in the ditch will be 10 feet above that in the river, and at the end of the tenth mile will be 100 feet higher, and will thus cover land which is less than 100 feet in altitude above the stream at this locality. It is usual to construct some device at the upper end of each ditch or canal by which the amount of water entering from the river can be regulated. Without this, flood-waters would fill the ditch beyond its capacity, and would overflow and wash away the banks. In times of low water, also, the stream may fall to such an extent that it must be raised somewhat and forced into the ditch, and at all times it may be necessary to regulate the flow in order to apportion the water fairly to all concerned. In the case of the simplest ditch, a small dam of brush and stone is built diagonally or into or across the stream-bed as the water becomes low in summer, and this is made tight by means of sod and earth. More permanent dams are sometimes built of timber, or masonry. The head-gate or regulator of the canal placed at the end of the dam consists of a stout framework firmly bedded in the earth or rock with one or more openings, each of which can be closed by a gate sliding vertically. The water enters under the gates, the quantity being controlled by raising or lowering them.

A considerable slope can be used for small ditches, since the volume of water is not sufficiently great to move the large particles of sand and gravel. As a general rule, conduits of this character built in common earth should be so proportioned as to have an average velocity of a little less than three feet per second, or two miles per hour, when carrying their full capacity. It is necessary, therefore, to take into consideration the amount of water to be carried and from this deduce the size and shape of the cross-section of the canal or ditch in order to obtain the desired velocity. If the grade be excessive the seepage or loss of water becomes large. The shape of the cross-section of a canal depends largely upon the character of the surface soil. In light or sandy soil, where the earth is easily eroded, very gentle side slopes are given, while in harder materials the side slopes can be steeper. When the fall of the canal is so great that it is impracticable to allow the water to flow freely down the slope, devices known as drops are introduced. These consist of an arrangement whereby the water can drop to a lower level without injury to the canal. Drops are usually built of planks with a sharp overfall edge, and a low dam or obstruction below the fall in order to maintain the pool. Occasionally

they are made in the form of an incline, with a pocket at the bottom to break the force of the falling water. They are expensive to build, and difficult to maintain, because of the rapidity with which the timbers decay and the wearing action of the water, which constantly tends to cut exposed portions.

It is necessary in the construction of nearly every ditch or canal to take water across a depression at some point in its course. This is usually done by means of a flume or long box, usually rectangular and supported above the ground by a frame or trestle of timber or iron. Such flumes are often used across rocky ground where it is impracticable to dig a ditch. This is particularly the case near the head, where the water, after being taken from the river, is often carried through a narrow, steep-walled cañon. Here the foundation for a flume is prepared along the rocky cliffs, supports being devised to suit the inequalities of the ground. A better, though more expensive, type of flume is that having a semicircular section, and built of narrow planks or staves laid side by side and held in place by iron bands run around the flume, joined by nuts and threads by which the bands can be drawn up and the staves brought together. In crossing very deep depressions it is necessary to have a correspondingly high trestle in order to carry the flume across on grade. Such high trestles are expensive and liable to destruction from storms. In their place there have been built inverted siphons, wooden stave-pipe, or aqueducts of other form. The stave-pipes are similar in construction to the semicircular frame of narrow plank, carefully planned to a given dimension, and held in place by circular iron bands or hoops.

Application of Water.—The methods of irrigation practised in various parts of the United States differ with the climatic conditions and soil, and especially with the early habits of training of the irrigators. The methods of conserving and applying water have been improved under the stimulus of modern invention, although there has been little if any scientific or well-considered information available. Water is applied to the irrigated field in three ways—by flooding, by furrows, and by sub-irrigation.

Flooding.—This is done by the check system and by wild flooding. By the latter process the irrigator turns the water from a ditch over a level field and completely submerges it. Perfectly level fields are, however, comparatively rare, and the first step in primitive agriculture by irrigation has been to build a low ridge around two or three sides of a slightly sloping field, so that the water is held in ponds. These low banks are commonly known as levees or checks. In construction they are frequently laid out at right angles, dividing the land into a number of compartments. Water is turned from a ditch into the highest of these compartments, and when the ground is flooded the bank of the lower side is cut or a small sluice-way opened, and the water passes into the next field, and so on until each in turn is watered.

Furrows.—Irrigation in checks has gradually been given up, owing to the expense of leveling and leveeing the ground. With experience the irrigator has become able to apply water to crops which are cultivated in furrows, without resorting to such expensive means. The furrows are plowed in such a direction that the water

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when turned into them from the lateral ditches will flow freely down them without washing away the soil. When the water has completely filled the furrows, and has reached the lowest points, the little streams are cut off and turned into another set of furrows. The methods of doing this differ. Sometimes the irrigator simply cuts the bank of the distributing ditch with a shovel and then closes the opening after sufficient water has escaped. A more systematic method is commonly employed in California. Water is carried to the furrows in a small box-flume with openings in the side. These openings are closed by little shutters and a number can be opened at once, permitting a certain quantity of water to escape into each furrow. The slope given the furrows determines to a certain extent the amount of water received by the soil. If the fall is very gentle, the water moves slowly and a large portion is absorbed while the furrow is being filled. If steep, the water quickly passes to a lower end and the ground does not absorb so much. When the entire field has been watered the furrows are usually plowed out and a thin layer of the top soil stirred to make an open, porous covering or mulch, preventing excessive evaporation and allowing the air to enter the ground. Without such cultivation a hard crust may be formed. The loosening of this crust breaks the capillary connection with the moisture beneath and thus lessens the loss of water. For irrigating small grain, such as wheat, the ordinary plow furrows are not used. The fields, brought to a uniform surface, are thoroughly cultivated, and after the grain has been sown, small parallel lines are made similar to furrows, but smaller and nearer together. These tiny channels are made either by a peculiar drag or by a roller upon which are projections so arranged as to make small grooves in the soil. These are made in the direction of the desired slope, so that the water can flow down the marks through the grain as it would in furrows through a cornfield. The rapidly growing grain shades the surface and prevents the formation of crust, rendering subsequent cultivation unnecessary. In order to cause the water to spread from the lateral ditches into the furrows through the ground, use is made of the tappoon—a small sheet of metal of such shape as to fit across the ditch. This can be forced into the soft earth, making a small dam and causing the water to back up and overflow the field of grain. Sometimes a canvas dam is used.

Furrow-irrigation is usually employed in watering trees and vines. In some localities, however, basin or pool irrigation is practised. The supply is conducted often in cement-lined ditches and by wooden flumes as near as possible to the trees and vines, and is then turned out into the furrows plowed around or near the trees. The water issuing from small apertures in the side of the wooden box falls into the furrows and is immediately conducted to the vicinity of the trees. Care is usually taken that the water shall not actually touch the tree-trunks, and it is extended far enough about the extremities of the roots to encourage these to spread outward. After the water has traversed the furrows to the lower end of the orchard, the supply is cut off, and the ground is tilled as soon as the surface dries sufficiently.

Sub-irrigation.—Attempts have been made to conduct the water beneath the surface imme-

dately to the roots of the trees, thus preventing waste by evaporation from the surface of the ground. Few devices have been successful, owing to the fact that the roots of the trees rapidly seek and enter the openings from which the water issues, or, surrounding the pipe by a dense network, cut off the supply. Porous clay tiling has been laid through orchards, and also iron pipes perforated so as to furnish a supply of water along their length. A machine has been invented and successfully used for making cement-pipe in place. Small trenches are dug through the orchard between the trees and the pipe-making machine deposits the material in the trenches, which are filled with earth as soon as the cement is set. Water is thus distributed underground where needed. In orchards where sub-surface irrigation has been unsuccessful because of roots stopping up minute openings beneath the surface, the system has been reconstructed and water has been brought to the surface at or near each tree by means of small hydrants. Vertical pipes are placed at short intervals leading to the level of the ground, and in these are small iron gates or shutters so arranged that the flow can be cut off in the buried pipe. For annual or root crops sub-irrigation has been successfully practised by the use of small iron pipes partly open at the bottom, allowing a small amount of water to escape. These pipes are laid 12 inches or more beneath the surface, and are connected with lines of tile or clay pipes leading from the reservoir or source of supply. As the crops are removed each year, and the ground cultivated, the roots have no opportunity to stop up the pipes. The term sub-irrigation is occasionally applied to conditions occurring in nature where water percolates freely beneath the ground for a considerable distance sufficiently near the surface to supply the need of crops. Where the subsoil transmits water freely, irrigation ditches may sub-irrigate large tracts of country without rendering them marshy. Thus farms may obtain an ample supply of water from ditches half a mile or more away without the necessity of distributing small streams over the surface. In the San Joaquin Valley, California, vineyards in certain localities are thus maintained in good condition, although water has not been visibly applied for many years.

Quantity of Water.—The amount of water required for raising crops varies according to the character of the soil. The plants themselves need a certain minimum supply, but a far larger quantity is required to saturate the surrounding soil to such a degree that the vitalizing processes can continue. Prof. F. H. King of Madison, Wis., has found by direct measurements that from 300 to 500 pounds of water are required for each pound of dry matter produced. When the ground is first irrigated an enormous quantity of water is sometimes required to saturate the subsoil. The quantity of water turned upon the surface during the first year or two has frequently been sufficient to cover the ground to a depth of 10 to 20 feet, and in some cases an amount equal to a depth of 5 feet or more per annum has been thus employed for several years. Gradually, however, the dry soil is filled. The pioneers of irrigation frequently use too much water, often to their disadvantage.

The quantity of water used in irrigation is usually stated in one of two ways: (1) In

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terms of depth of water on the surface; (2) in quantities of flowing water through the irrigating season. In the humid regions the rainfall is usually from three to four inches per month during the crop season. In the arid region, where the sunlight is more continuous, and the evaporation greater, there should be for the ordinary crops at least enough water during the growing season to cover the ground from four to six inches in depth each month. The second method of stating the quantities necessary for irrigation is of convenience when considering a stream upon which there is no storage. It is estimated that one cubic foot per second, flowing through an irrigating season of 90 days, will irrigate 100 acres. One second-foot will cover an acre nearly two feet deep during 24 hours, and in 90 days it will cover 180 acres one foot deep, or 100 acres to a depth of 1.8 feet, or 21.6 inches. This is equivalent to a depth of water of a little over seven inches per month during the season of 90 days. Successive years of deficient rainfall in southern California from 1897 to 1900 served to prove that, with careful cultivation, crops, orchards, and vineyards can be maintained by using very small quantities of water. In some cases an amount not exceeding six inches in depth was applied during the year, this being conducted directly to the plants, and the ground kept carefully tilled and free from weeds. As estimated by various water companies in southern California, one miner's inch of water will irrigate from five to ten acres, the miner's inch equaling 12,960 gallons in 24 hours, or almost exactly 0.02 second-foot, this being the amount delivered under a 4-inch head, measured from the centre of the opening. Under this assumption one second-foot should irrigate from 250 to 500 acres. If it be assumed that one miner's inch is allowed for ten acres, or one second-foot for 500 acres, this quantity of water flowing from May to October, inclusive, will cover the ground to a depth of a little over seven tenths of a foot. The method of applying water largely governs the amount used. With alfalfa flooding is practised; with small grains the water is run in furrows; while with orchards the water is sometimes applied directly to each tree, or is run in furrows, four or five in each case between two rows of trees.

The annual charges for water by the acre in southern California, where this economy of water is practised, have been as low as \$3, and from this rising to \$15 or more per acre. For good farming in parts of the arid region outside of southern California, a depth of from 24 to 30 inches of water during the crop season should be sufficient. The usual charge for this quantity is from \$1.00 to \$2.00 per acre irrigated per annum. The temperature and the wind-movement introduce so many conditions that broad statements of this kind are merely suggestive, and not to be followed as rules.

Where an excessive amount of water is put upon irrigated land, as high as 70 per cent has been known to pass by seepage to the lower grounds. Growing plants evaporate in many cases 300 times their own weight of water each year. If a crop be carelessly cultivated and weeds allowed to grow with plants, the worthless plants waste as much water as is used by those that are valuable. But with careful cul-

tivation the evaporation is lessened and the waste of water is prevented. Thus the quantity of water required is only one half or one third of the amount needed where the farming is carelessly done.

Users' Rights.—The first settlers frequently laid claim to the whole flow of the stream. Soon after the first ditch was built others were constructed a few miles above or below. As long as the stream is of sufficient volume to fill each of the ditches, no difficulties from this arise; but sooner or later the increasing size and number of ditches and canals result in diminishing the flow in the river to such an extent that it becomes low, and water does not reach the ditches farthest downstream.

The result has been that in many parts of the arid region, owing to scarcity of water, lawlessness has prevailed, and every man has endeavored to obtain for his own crops as much as possible of the scanty supply. Usually the irrigators elected a water-master to apportion to each claimant a certain amount of water, or assign certain days or hours upon which water can be used. Often the quantity of the water has been settled only after vexatious lawsuits or neighborhood quarrels. In some parts of the arid region, notably in Wyoming and Colorado and Idaho, the States have undertaken the regulation of disputes, and have created special boards or tribunals to consider the matter and apportion water.

Methods of Obtaining Water.—In the arid region water can be obtained frequently by digging or boring wells at points near stream-channels or along the foot-hills. Out on the broad valleys it may be necessary to go to a depth of from 100 to 300 feet or more before reaching moisture. Where the supply of water from wells is ample, various devices have been employed, such as windmills and gasoline engines, for bringing it to the surface. It is very important to continue the borings through the water-bearing sands or gravel, so as to take advantage of the full thickness of the pervious deposits. Perforated pipe is often driven into the layers of coarse gravel, and adds greatly to the capacity of the well. Artesian or flowing wells may be sunk wherever water held under pressure in pervious material is overlaid by clay. In a well dug through the impervious layer into the gravel the water will rise to a height equal to the line of saturation of the gravel stratum in the surrounding country. Artesian conditions occur in nearly every State, but they do not extend over any considerable portion of the country, excepting on the Great Plains and in California. Wherever they occur the water has especial value on account of the convenience incident to its rising above the surface. In some places, as the James River Valley of South Dakota, the pressure is 100 pounds or more to the square inch, throwing the water to a considerable height and enabling the wells to be used as sources of power. The quantity of water to be had from deep wells is governed by the diameter of the well, the structure and thickness of the water-bearing rocks, and the pressure sustained by the water. With relatively dense rocks a slight head of water will throw only a feeble stream, but from thick layers of open gravel or sand rock large volumes are delivered. It frequently occurs that a 4-

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inch pipe will deliver all of the water which can reach this point, and increasing the diameter of the well will not alter the flow.

While most of the water used in irrigation is diverted by gravity from flowing streams, yet, as regards value, it may be said that some of the most important sources of supply are utilized through pumping. In some localities where horses have little value, pumping by horse-power is in vogue. The practicability of irrigation in this way is limited largely by the depth of the water and the number of animals available. The force of flowing water itself is frequently employed to bring water up to the level of the irrigable land, the bucket-wheel having been utilized from the earliest historical times up to the present. The most important source of power for pumping water is wind. Over the broad valleys and plains of the arid region the wind-movement is almost continuous for days and weeks. It is a comparatively simple and inexpensive operation to sink a well into the water and erect a windmill, attaching this to a suitable pump. A windmill once erected on the plains is operated day and night by the wind, bringing to the surface a small but continuous supply of water. This small stream if turned out on the soil would flow a short distance, then disappear into the thirsty ground, so that irrigation directly from a windmill is usually impracticable. To overcome this difficulty it has been found necessary to provide small storage reservoirs or tanks, built of earth, wood, or iron, to hold the water until it has accumulated to a volume sufficient to permit a stream of considerable size to be taken out for irrigation. Such a stream, flowing rapidly over the surface, will penetrate to a distance and cover an area much greater than is possible with the small flow delivered by the pump. One disadvantage connected with the use of windmills is that most of them are constructed to operate only in moderate winds. As the strength of the wind increases, the wheel begins to revolve, increasing in efficiency until the velocity of the wind is about eight or ten miles an hour. At greater speed the mills are usually so constructed that the efficiency decreases rapidly as the wind becomes more powerful. When it approaches a gale, the mill stops completely.

In many places drainage-works are a necessary adjunct of irrigation. On bench-lands or gently sloping hillsides the water which escapes from one man's farm is eagerly caught and used by his neighbor below, and there is none left to stagnate, the surplus from the cultivated lands being often of great value in watering the lower meadows. There are cases, however, where the question of disposing of the water is as important as that of obtaining it. These are on the nearly level lands, where the subsoil has been filled to saturation by the water which has no opportunity to escape, and expensive works are required in order to redeem the lower lands for agricultural purposes.

Duty of Water.—The amount of land which can be irrigated with a given quantity of water, or the relation which these bear to each other, is commonly expressed by the term duty of water. The investigation of the duty of water is one of the most complicated problems of irrigation. There is such a difference in methods of measurement, localities, soils, crops, ap-

plication of water, and frequency of watering that the statements made by different persons are almost irreconcilable. In general, more water is used, or the duty is less, on the newer land than on that which has been cultivated by irrigation for some years. The rainfall also affects the quantity used, and as this is exceedingly irregular, the amount of water applied each year fluctuates. Seepage likewise complicates matters, for a field may often receive considerable water indirectly and require less by direct application. The duty of water is quoted at from 30 to 500 acres or more to the second-foot. For convenience the unit of 100 acres to the second-foot has been considered as indicating careful irrigating, although in the more southwestern portion of the arid region this would be considered low, and in the northern part high.

Since the value of water per second-foot varies largely with its duty, it will be recognized that it is exceedingly difficult to estimate. However, it is necessary to arrive at certain averages in order to approximate the possible values of river, or of storage basins, in the future development of the country. It has been estimated that a perpetual water-right is worth from \$25 to \$50 per acre in a grain or grazing country, and as high as from \$100 to \$500 per acre for fruitland, rising in southern California for the best citrus lands even to \$1,000 or more per acre.

Alkali.—The accumulation of alkali in irrigated lands presents one of the most serious problems encountered in this method of agriculture. The injuries from the presence in excess of earthy salts are usually evident in the corrosive action of the tender bark, especially at the root-crown. Experiments made in California show that apple-trees are severely injured by the presence of 3,000 pounds of common salt per acre, this amount being disseminated through four feet in depth. On the other hand, the olive thrives at Tulare, where the soil contains as high as 5,600 pounds of salt per acre. Alfalfa, when young, is easily killed by alkali, but it has been found to thrive in soil containing as much as 6,000 pounds of common salt, 3,000 pounds of carbonate, and over 1,000 pounds of sulphate, per acre, distributed through six feet in depth. Sugar-beets also have been known to grow well where a large amount of alkali is present. Grapes apparently are least affected by small amounts of alkali, while peaches and lemons are more susceptible to injury because of its presence. The recently introduced salt-bush is notable for its ability to grow in alkaline lands, and sorghum and alfalfa, especially when the latter has reached maturity, are almost equally vigorous.

The most effective way of removing alkali is by underdrainage through tiles laid at a depth of from three to five feet, the drainage-water being allowed to escape into a stream, or into a well from which it can be removed by pumping. Recent authorities on the subject claim that the trouble caused by alkali yields sometimes to careful treatment, and that science has partly solved the problem. It is shown that the tiling of land for alkaline washing costs no more than drain-tiling as practised on eastern farms. In the government demonstration at Salt Lake City, where the percentage of alkali is enormous, the lines of tile are 150 feet apart. The water de-

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scending into the soil dissolves large quantities of alkali near the surface and carries it off in solution. Land so tiled, even if badly alkaline, can be returned to profitable cultivation in time if heavily irrigated, and within one year can be used for the production of some crops suited to the climate. Large areas of alkali land in the West may be reclaimed at a cost below the actual increase in the value of the land. It is thought that the time will soon come when drainage will be as common in the irrigated districts as are the tile-drained fields of the Middle West.

States Compared.—In the number of irrigators California stands far ahead of any other State, having about one fourth of the total number in the United States. Colorado, however, exceeds in the number of acres irrigated, although not in the value of irrigated crops. In this respect California leads, having a value double that of Colorado, and over one third that of the total value of irrigated crops in the United States. The greatest percentage of increase in the number of irrigators has been in the State of Washington, and the least in Oregon. This, doubtless, is due to the fact that in irrigation Oregon reached a certain culminating point previous to 1889, while in Washington the construction of ditches had only begun.

Comparison of Crops.—In considering the character and value of the crops produced on irrigated land in the arid States and Territories, hay and forage form the most important item, being over one third of the whole. Cereals—principally wheat, oats, rye, and barley—come far below the forage crops; and next to these in order are vegetables, orchard fruits and small fruits. In California only the orchard fruits surpass the forage crops in value. The large production of hay and forage under irrigation illustrates the fact that in these States irrigation is, to a large extent, an adjunct of stock-raising. The production of cereals under irrigation is relatively small. In California, for example, only 6.0 per cent of the wheat is irrigated, and 8.0 per cent of the barley. The total value of all the cereals produced under irrigation in the United States is far less than that of those produced in almost any one of the humid States of the East; in New York, for example, though it is not considered a farming State, the value of the cereals raised is more than double that of the entire amount produced under irrigation in the whole country. In many localities the irrigation of cereals and staple crops has been brought about by local conditions, such as difficulty of transportation and consequent heavy cost of importation. The irrigated cereals in such localities are raised almost wholly for local consumption, and do not enter the markets of the world.

Economic Bearings.—Irrigation has important economic aspects especially seen in the greater success of the small irrigated holding. The Salvation Army, following the example of the Mormon colonies of 1847 in Utah, and of the Greeley community in California, has located small communities on reclaimed farms. The process of colonization will always be slow from the nature of the case, and the effect on eastern agriculture, far from being sudden and severe as was urged by the opponents of the Irrigation

Bill in 1902, will be gradual. It may be very beneficial in forcing eastern farmers to more careful use of their water-supply, and perhaps to the adoption of a modified scheme of irrigation, which has been found to increase crops even in humid districts, and which would at least be a valuable resource in times of drought.

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Irrigation Bill, or Reclamation Act, a Federal measure, dated 17 June 1902, for the reclamation by irrigation of arid and semi-arid lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington and Wyoming. See **IRRIGATION**.

Irish, ir'tish, a river of Asia, which rises in China, in the Altai Mountains, and after expanding into Lake Zaisan, flows through the Russian territory of Semipalatinsk, passes the town of Tobolsk, and finally, after a course of about 1,800 miles, joins the Obi near Samarova. Much of its course is through low plains and steppes, and its navigation is much impeded by shifting sands. Its fisheries, particularly of sturgeon, are very productive.

Irvine, William, American Revolutionary general: b. near Enniskillen, Ireland, 3 Nov. 1741; d. Philadelphia 29 July 1804. Having graduated at Dublin University, he studied medicine and surgery, and was appointed surgeon on board a ship of war, serving during a part of the war of 1756-63 between Great Britain and France. On the declaration of peace he emigrated to America, and in 1764 settled in Carlisle, Pa., where for 10 years he practised his profession. At the opening of the Revolution he took part with the colonies, was a member of the provincial convention assembled 15 July 1774, until he was appointed by Congress, 10 Jan. 1776, colonel of the 6th battalion of the Pennsylvania line. On 12 May 1779 he was promoted to the rank of brigadier-general, and assigned to the command of the 2d brigade of the Pennsylvania line. In the autumn of 1781 he was ordered to Fort Pitt, to take command of the troops on the western frontier, and continued to fulfil the duties of this post until after the war had closed. He was early in 1785 ap-

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pointed by the State agent under an "act for directing the mode of distributing the donation lands promised to the troops of the commonwealth." About this time he suggested to Pennsylvania the purchase from the United States of the tract of land known as "the triangle," thus giving to the State an outlet upon Lake Erie. He was a member of Congress under the confederation 1787-8, and of the Federal Congress 1793-5. In 1794 he was assigned to the command of the Pennsylvania troops for the purpose of quelling the "whiskey insurrection," and in all the most important movements in connection with this subject took an active part. He was president of the State society of the Cincinnati at the time of his death.

Irving, ér'vīng, Edward, Scottish preacher, founder of the religious sect known as Irvingites: b. Annan, Dumfriesshire, 4 Aug. 1792; d. Glasgow December 1834. He was graduated at the University of Edinburgh, and in 1815 became a licentiate of the Church of Scotland and subsequently Dr. Chalmers' assistant. In 1822 he became minister of the Caledonian Asylum chapel in Cross Street, Hatton Garden, London. Here he soon attracted very large congregations by the force and eloquence of his discourses, and the singularity of his appearance and gesticulation. The greatest orators and statesmen of the day crowded with the wealthy and fashionable to hear him. The appearance of the preacher — tall, athletic, and sallow — displaying a profusion of jet-black glossy hair reaching to his shoulders, with a singular obliquity in one of his eyes, and a stern calm solemnity of aspect, enhanced the interest and excitement produced by his discourses. His phraseology was one of the peculiarities which gave him *éclat* with the public, for he expressed his ideas in the language of Milton, Hooker, and Jeremy Taylor. At London he began to publish books in which he broached novel theological views. 'Sermons, Lectures, and Occasional Discourses,' in which his theological peculiarities were first distinctly enunciated, were published in 1828. In the beginning of 1832 his aberrations had become so marked and extraordinary that his hearers, who in 1829 had erected for him a large church in Regent Square, preferred charges against their minister. On 2 May 1832 the London presbytery unanimously found him guilty of error. The consequence was that he became dispossessed of his cure. In 1833 the presbytery of Annan, which had licensed him, deposed him from the ministry, on which occasion his defense of himself was a sublime effort of oratory. He retired to Scotland, broken in health and spirits, and was attacked with consumption. For the religious sect he founded see CATHOLIC APOSTOLIC CHURCH. His life has been admirably written by Mrs. Oliphant.

Irving, Sir Henry (originally JOHN HENRY BRODRIBB), English actor: b. near Glastonbury 6 Feb. 1838. He was for a time a clerk in London, but adopted the theatrical profession, his first appearance being at Sunderland in 1856. He appeared for the first time in London at the Princess' Theatre, in 1859, after which he went to Manchester, where he remained for five or six years, but returned to London in 1866, where his first marked success was as Digby Grant in Albery's 'Two Roses' (in 1870), which was

followed by his powerful impersonation of Mathias in 'The Bells.' His next noteworthy parts were Charles I., Eugene Aram, and Richelieu, in the plays so named. In 1874, at the Lyceum Theatre, he sustained the part of Hamlet so successfully as to raise himself to the first place among English actors. His chief Shakespearian parts are Macbeth, Othello, Shylock, and Richard III. In 1878 he leased the Lyceum Theatre for himself, and has since put on the stage in excellent style 'Othello,' 'The Merchant of Venice,' 'Much Ado About Nothing,' 'Romeo and Juliet,' 'Twelfth Night,' 'Faust,' 'Macbeth,' etc., playing in them the principal character with Miss Ellen Terry. His appearances in the provinces have been equally successful with those in London, and he has met with like favor in his repeated visits to the United States. Of his more recent roles may be cited Becket in Tennyson's play of that name (1893), King Arthur in a play of that name (1895), Napoleon in 'Madame Sans-Gêne' (1897), the title role in his son's play of 'Peter the Great' (1898), and Robespierre in a play of that name (1899), specially written for him by M. Victorien Sardou, and the title role in 'Dante' (1903). He was knighted in 1895, and in 1898 Cambridge University conferred on him the honorary degree of LL.D.

Irving, Washington, American author: b. New York 3 April 1783; d. Tarrytown, N. Y., 28 Nov. 1859. His father, William Irving, merchant, came to New York from the Orkneys in 1763, having married Sarah Sanders, daughter of Cornish parents, two years before. Washington was the youngest of their 11 children. His school training was far from thorough, and was not directed toward academic culture — though two of his brothers had been sent to Columbia College — a decision of his father that he much regretted in maturer years. He made up for his lack of interest in school subjects by enthusiastic reading in English authors, particularly Chaucer and Spenser. At 16 he entered a law office, and in 1802 began authorship by contributing humorous sketches, over the name of "Jonathan Oldstyle," to *The Morning Chronicle*, a daily edited by his brother Peter. Developing symptoms of consumption, he sailed in 1804 for France, and spent two years in travel, on the continent and in England, which restored his health. On return he was admitted to the bar, but instead of practice began, in 1807, with his brother William, and James K. Paulding, the issue of 'Salmagundi,' the success of which determined his career, and the immediate character of his writing. At the close of the next year he set about reshaping the burlesque history of New York, which he had begun, with Peter Irving, some time before on a different plan. While in this work he met with the great affliction of his life, the loss of his betrothed, Matilda Hoffman, daughter of a prominent lawyer of the city, in whose office he had finished his legal studies. The completion of the book, 'Dietrich Knickerbocker's History of New York,' published in 1809, was the only solace that he permitted himself in the first months of seclusion and grief. In 1810 he wrote a short life of the poet Campbell, and was received into partnership by his brothers Peter and Ebenezer, who were founding an importing house, and wished to provide



WASHINGTON IRVING.

IRVINGITES — ISAAC

Washington the means, without contribution of time or labor to the business, of preparing himself more fully for his chosen work. In 1813 and 1814 he edited the 'Analectic Magazine,' published in Philadelphia, and contributed biographical articles upon some of the naval commanders in the war then in progress with Great Britain. After the burning of our national capital in 1814, he offered his services to his native State, and was made aide-de-camp to Governor Tompkins, with the rank of colonel. At the close of the war he sailed for England, and was received with distinction by the American artists Allston and Leslie, and by Scott, Campbell, Moore and other literary men. In 1818 the firm of P. and E. Irving and Co. failed, and Washington's pleasant rambles in England and Scotland came to an end. He declined a post in the navy board, at home, and set himself at work in London with his pen. Early in the next year he sent over for publication in New York and Philadelphia, the first number of the 'Sketch Book,' containing 'The Voyage,' 'Roscoe,' 'The Wife,' and 'Rip Van Winkle.' Other numbers followed, the success was great, and in 1820 John Murray brought out an edition of the work in London. Its popularity with British readers was such that Murray became the first publisher of 'Bracebridge Hall' (1822), 'Tales of a Traveller' (1824), and other works. In 1826 Irving went to Madrid, at the instance of his friend, Alexander H. Everett, American minister to Spain, who advised the translation of Naverrete's 'Voyages of Columbus,' then issuing in parts. Irving found the work impracticable to translate, being a collection of sources rather than a consistent narrative, and prepared instead the 'History of the Life and Voyages of Christopher Columbus,' finished in 1828. This first serious product of Irving's powers retained much of the ease and charm of 'The Sketch Book' and 'Tales of a Traveller,' and was eminently adapted to increase his fame. It was not especially successful, though Murray paid 3,000 guineas for the copyright; an abridgment of the work had a better sale. 'The Conquest of Granada' (1829), 'Companions of Columbus' (1831), and 'The Alhambra' (1832) were further fruits of his Spanish studies and travel. In the meantime he had been made secretary of legation (1829), in London, and received the medal of the Royal Society of Literature (1830), and the degree of LL. D. (1831) from Oxford. In 1832 he returned to America, but not to rest. He accompanied an Indian commission to Fort Gibson, on the Arkansas River, and wrote 'Tour on the Prairies,' published as the first volume of 'Crayon Miscellanies,' in 1835. The second volume, 'Abbotsford and Newstead Abbey,' and the third, 'Legends of the Conquest of Spain,' followed in a few months. He now bought the little Van Tassel farm, at Tarrytown, and began to enlarge its Dutch cottage, and improve the grounds. To this home, called "Sunnyside," he soon removed from the city, and eventually brought to it the brothers who had aided him in earlier years. In 1836 he finished 'Astoria,' with the help of his nephew, Pierre M. Irving, from materials furnished by John Jacob Astor. The next year he published 'The Adventures of Captain Bonneville,' properly a continuation of the preceding. He then began a history of the conquest

of Mexico, but on learning that W. H. Prescott was at work on the same subject, resigned the task to him. In 1839 he engaged to write for the 'Knickerbocker Magazine,' and furnished monthly articles for about two years. In 1842 he was appointed Minister to Spain, and for the next four years wrote little. On return he arranged with G. P. Putnam for a complete edition of his works, in 15 volumes, to which he added (1849) the 'Life of Goldsmith,' and (1850) 'Mahomet and his Successors.' The way was now open for the 'Life of Washington,' which had long been contemplated. In 1855 appeared 'Wolfert's Roost,' mainly a reprint of the Knickerbocker papers, and two volumes of the 'Life.' The work told on his strength, and the fifth and last volume, finished in March, 1859, left him a broken man. His death was from heart disease, in his 77th year. He was buried by the side of his mother, whose tastes he had inherited, and whose sympathy and nurture had made him what he was. His authorship was the outcome of his personal character, and was little modified by the literatures of the world. With all his graces of expression, he lacked the gift of deep insight, and failed to achieve much vigor of style. The best biography is still the 'Life and Letters' by his nephew, Pierre M. Irving (1863). Consult also Warner, 'Washington Irving' (1881); Laun, 'Washington Irving: Ein Lebens- und Charakterbild' (1870); Richardson, 'American Literature' (1887-8); Wendell, 'A Literary History of America' (1900).

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Ir'vingites. See CATHOLIC APOSTOLIC CHURCH.

Ir'vington, N. J., a town in Essex County, adjoining Newark on the southwest. It is a pleasant residential suburb of that city, and also has a number of manufactories, among which are smelting-works and establishments for making wall-paper, pocket-book frames, tools, brushes, rules, etc. The town was incorporated in 1898, although its settlement dates back almost to 1660. Its governmental affairs are in the hands of a town council. Pop. (1900) 5,255.

Irvington, N. Y., village in Westchester County, on the Hudson River, and the New York C. & H. R. railroad, 23 miles north of New York, and a short distance south of Tarrytown; named in honor of Washington Irving. It is mainly a residential village of recent growth and is noted for its beautiful dwellings and grounds, with their fine situation on the river-bank. These are largely the homes of New York business men and their families. The Guitéau Library and the town-hall are among its most noteworthy buildings. The village is a place of great interest as being the location of "Sunnyside," for many years the home of Washington Irving. The house, half a mile north of the railroad station, "is a many-gabled, vine-clad cottage, covered with stucco, and shadowed by grand trees." It has been rebuilt and enlarged. Pop. (1900) 2,231.

Isaac, i'zak (Heb. "he will laugh"), Hebrew patriarch, the son of Abraham by Sarah, so called to denote the laughter and gladness occasioned by his birth. He is remarkable for his miraculous escape from death as a burnt-

ISAAC—ISAIAH

offering; and for the fraud perpetrated upon him, at his wife Rebecca's instigation, by his son Jacob, to the injury of Esau. He died at Hebron 180 years old, and was buried in the cave of Machpelah, the resting-place of Sarah and Abraham, and of Rebecca.

Isaac I., Comnenus, Byzantine emperor: d. 1061. He was the son of Manuel Comnenus, an eminent general under Basil II., emperor of Constantinople, and was the first of his family to assume the purple. He had distinguished himself as a soldier and commander in the wars against the Arabs in Asia Minor, and had married a captive Bulgarian princess. In 1057 he succeeded to the throne upon the deposition of the aged and incompetent Michael VI. He strengthened the frontiers of the empire against the Arabs of the south and the nomad tribes of the Don and Dniester on the north; he also improved the financial condition of the government by an impartial imposition of taxes on all ranks of life. He abdicated in 1059 and spent the remainder of his life in a monastery. He was a learned student of Greek literature, one of the ablest and best of the Byzantine emperors and was succeeded by Constantine X., Ducas, the second of the Comnenian dynasty.

Isaac II., An'gelus, Byzantine emperor: d. 1204. He became sovereign of the East in 1185, and reigned 10 years. Isaac was a vicious and cowardly prince, and was dethroned, blinded, and imprisoned by his brother Alexius in 1195. Eight years later he was restored to the throne and reigned for six months, when he was again dethroned, and soon after died in prison.

Isaak Church, The, the finest building in Russia, or in northern Europe, begun by the Empress Catherine, and finished by Nicholas I. The foundation alone is said to have cost \$1,000,000. It is a magnificent structure, one of the most remarkable sights of the Russian capital. The design is simple and majestic, the whole being surmounted by a gilded dome. The total cost of the structure was \$67,500,000.

Isaaks, Jorge, Hor'hā ē'säks, Colombian novelist and poet: b. Cali, State of Cauca, Colombia, 1843; d. 1895. He was the son of an English Jew who had married a Spanish woman and was taken to Bogotá in childhood, and ever after made it his home. He published a volume of poems in 1864, and in 1867 his masterpiece, the novel 'Maria,' a story of domestic life in Colombia, told with consummate skill and tender simplicity.

Isabela, ē-sā-bā'lā, Philippines, province of Luzon, on the northern Pacific coast of the island with Cagayán on the north and Príncipe and Nueva Ecija on the south; length 118 miles; area 5,395 square miles (including dependent islands), the largest province of Luzon. The Sierra Madre mountain range runs parallel to the coast, a short distance inland; the rest of the surface is broken by low hills; the Grande de Cagayán River traverses the entire length of the province; and the main highway from Aparri to Manila parallels this river. Rice, sugarcane, chocolate, coffee, corn and vegetables grow with little cultivation; tobacco is extensively raised and its growth and treatment is the most important industry; this tobacco is regarded as the best in the Philippines and is the chief export of the province. Cattle raising is

also an important industry. Civil government was established in 1901, and the people have shown themselves generally friendly to it. Pop. 48,300.

Isabella (iz-a-bel'a) (I.) of Castile, queen of Spain, daughter of John II., king of Castile and Leon: b. Madrigal 23 April 1451; d. Medina del Campo 26 Nov. 1504. She married, 19 Oct. 1469, Ferdinand V., king of Aragon (q.v.), surnamed "The Catholic." After the death of her brother, Henry IV., in 1474, she ascended the throne of Castile, to the exclusion of her elder sister, Joanna. During the lifetime of her brother Isabella had gained the favor of the estates of the kingdom to such a degree that the majority, on his death, declared for her. After the kingdoms of Aragon and Castile were thus united, Ferdinand and Isabella assumed the royal titles of Spain. She was always present at the transaction of state affairs, and insisted that her name should be placed beside that of her husband in public ordinances. The conquest of Granada, after which the Moors were entirely expelled from Spain, was in a great degree her work; and the encouragement she gave Columbus assisted him to the discovery of America. In all her undertakings Cardinal Ximenes was her assistant. She has been accused of severity, but a spirit like hers was necessary to humble the haughtiness of the nobles without exciting their hostility, to conquer Granada without letting loose the hordes of Africa on Europe, and to restrain the vices of her subjects, who had become corrupt by reason of the bad administration of the laws. She checked private warfare, which had formerly prevailed to the destruction of public tranquillity, and introduced a vigorous administration of justice. In 1492 Pope Alexander VI. confirmed to the royal pair the title of "Most Catholic," already conferred on them by Innocent VIII. The zeal for the Roman Catholic religion, which procured them this title, gave rise to the Inquisition, which was instituted in Spain in 1480, at the suggestion of their confessor, Torquemada. See FERNAND V., XIMENES, and COLUMBUS. Consult Prescott, 'History of the Reign of Ferdinand and Isabella the Catholic.'

Isabella II., ex-queen of Spain, daughter of Ferdinand III.: b. Madrid 10 Oct. 1830; she succeeded her father in 1833, her mother being appointed queen-regent. The early years of her reign were disturbed by a rising in favor of her uncle, Don Carlos, who, if the Salic law had not been set aside, would have ascended the throne instead of her; but this was quelled in 1839. She was declared of age in 1843, and in 1846 was married to her cousin, Don Francisco d'Assisi (q.v.). Her reign was so despotic that a revolution took place in 1868, which drove her from the country. She resigned her claims to the crown in favor of her son Alfonso, who ascended the throne in 1875 as Alfonso XII.

Isabella the Catholic, Order of, a Spanish order of knighthood founded by Ferdinand VII. in 1815 as a reward for loyalty in defense of the Spanish-American colonies. It is now conferred for all kinds of merit. The badge of the order is an eight-pointed cross of gold.

Isabellita. See BUTTERFLY-FISH.

Isaiah, i-zā'yā or i-zī'yā (Heb. YESHA-YAHU, Salvation of Jehovah), the first of the

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four great Hebrew prophets who lived in the days of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. Of the circumstances of his life almost nothing is known, further than that he had an important influence over the kings and people. As his ministry commenced before the death of Uzziah, he must have been at the least 80 or 90 at the accession of Manassch. His residence seems to have been at Jerusalem, and he lived about 740–700 B.C. He had three sons, given to him “for signs and wonders in Israel.” As there is a manifest want of a continuous unity of design in the prophecies of Isaiah, a controversy has arisen as to who was the compiler of the book. The obvious answer, that it was Isaiah himself, assisted by a scribe, has been accepted by many, whose opinion is fortified by 2 Chron. xxxii. 32, from which it appears that Isaiah was otherwise an author. It is admitted that the “visions,” which were seen at different times, are not arranged in exactly chronological or material order; but an attempt has been made to account for this on the hypothesis of an original work with subsequent modifications. The dispute, however, with regard to the arrangement of the prophecies sinks into insignificance in comparison with that concerning their authorship. As the last 27 chapters seem to have been written in the time of the Babylonian captivity, they have been ascribed to a later “Isaiah,” and coherence of structure and unity of authorship have not been denied to them. The impugners of the Isaiah authorship rely for argument on the author having taken his standpoint at the close of the Babylonian captivity, and on his knowledge of the career of Cyrus, who lived more than a century after the death of Isaiah. A difference of style and sentiment is also urged as militating against the commonly accepted authorship. The argument on the other side is drawn from the predictive character of prophecy, and from the nature of “vision,” in which the prophet sees the future as if it were the present. The style of Isaiah unites simplicity and clearness with dignity and majesty. In fulness and power, he far surpasses all the other prophets. His writings are chiefly denunciations and complaints of the sins of the people, threats of approaching ruin, and anticipations of a more glorious future. The whole bears the stamp of genius and true inspiration, and is marked throughout by nobleness of thought and feeling. See Driver, ‘Isaiah, his Life and Times,’ and the commentaries by George Adam Smith and Marti.

Isar, ē'zär, a river of Germany, which rises in the Tyrol, enters Bavaria, flows past Munich to Freising, where it passes the towns of Landshut and Landau; and joins the right bank of the Danube a little below Deggendorf. Its length is about 190 miles. The current is extremely rapid, and is much used for floating timber.

Isarog, ē-sā-rög', an isolated mountain of the island of Luzon, Philippines, near the centre of the province of Ambos Camarines (Sur); it is an extinct volcano, height 6,450 feet. It lies between Lagony Gulf and Miguel Bay, and is the apex of the irregular mountain system which forms the watershed between these two bodies of water. It is 36 miles in circumference at the base, and a well built road makes a complete circuit of it.

Ischia, ēs'kē-ä, an island of Italy, 26 square miles in extent, in the Gulf of Naples. It is entirely volcanic in character, and is noted for its warm mineral springs and volcanic convulsions. In 1881 and 1883 earthquakes caused great loss of life and property. The capital, Ischia, with some 7,000 inhabitants, is a favorite resort of tourists. Other towns are Casamicciola and Forio, both of which suffered severely in 1883. Pop. (1901) 26,690.

Ish'maelites, the descendants of Ishmael, the son of Abraham by Hagar. These are to be found among the Arabians, as physical characteristics and language prove beyond a doubt. The Joktanite and Cushite monarchies in southern Arabia give no indication in character and habits of having had Ishmaelites as founders, but the Bedouins who roam over the deserts lying between the Peninsula of Sinai and the Persian Gulf, are unquestionably of Ishmaelic origin. They maintain a primitive and patriarchal form of life, and are full of Ishmaelic traditions.

Ishmailis, ish-mā'lēs, one of the 72 heretical sects of Mohammedanism (q.v.).

Ish'peming, Mich., city in Marquette County; on the Duluth, S. S. & A., the Chicago, M. & St. P., and the Chicago & W. R.R.'s; about 14 miles west of Marquette, and 58 miles north by west of Escanaba. It was settled about 1856 and received its first charter in 1857. It is situated in the great iron ore region of Michigan, and is the centre of the iron ore mining industry of the State. Gold and marble are found in the vicinity and an excellent building stone. The manufactures are chiefly the machinery used in mining. The school buildings rank in architecture and equipment with the best in the State. Pop. (1890) 11,197; (1900) 13,255.

Isinglass, a form of gelatine (q.v.), whitish firm in texture, and of great purity, prepared mainly from the sounds or air-bladders of different species of fish, especially of the Russian sturgeon and, in this country, of cod, sturgeon, hake, etc. In some cases the skins are also used for this purpose. Besides Russia, from which it has been principally obtained, the United States and Canada, Brazil and the East Indies furnish considerable quantities to commerce, as do also Manila and the West Indies. It is the basis of the Russian glue, preferred to all other kinds for strength. Isinglass receives its different shapes in the following manner: The sounds are taken from the fish while sweet and fresh, slit open, washed from their slimy matter, divested of a very thin membrane which envelops the sound, and then exposed to stiffen a little in the air. In this state they are formed into rolls about the thickness of a finger, and in length according to the intended size of the staple; a thin membrane is generally selected for the centre of the roll, around which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inward. Isinglass is best made in the summer, as frost gives it a disagreeable color, deprives it of its weight and impairs its gelatinous principles. Boiled in milk, it forms a mild nutritious jelly, and is thus sometimes employed medicinally. It is used in making court-plaster, cement, mock pearls, and many other articles, also in clarifying fermented liquors for improving soups,

ISIS — ISLAND

jellies, etc., and as sizing for linens, silk, gauzes, and other fabrics.

Isis, the principal goddess of the Egyptians, the sister and wife of Osiris, representing the moon, as Osiris did the sun. The Egyptians believed that Isis first taught them agriculture. She is represented in various forms. In one she has the form of a woman, with the horns of a cow, as the cow was sacred to her. She is also known by the attributes of the *lotus* on her head, and the *sistrum* in her hand, a musical instrument which the Egyptians used in the worship of the gods. She is often accompanied by her infant son Horus. In one celebrated Egyptian statue she was shown with her face veiled. She was particularly worshipped in Memphis, but at a later period throughout all Egypt. From Egypt her worship passed over to Greece and Rome.

Islam, a term which signifies the Mohammedan religion; complete submission of body and soul to God, His will and His service, as well as faith in all those articles of profession, commands, and ordinances ordained by Mohammed. Every man who makes this profession (*aslama*) is a Moslem, that is, has entirely given himself up to the will of God, and is, on that account, in a state of salvation (*salam*). It is held that Islam was once the universal religion, and that every child born in the true faith would abide in it, without defection, were it not for parental wickedness. As Islam comprehends the practical as well as the doctrinal tenets of the Mohammedan religion—every thing which Moslems must believe and practise—it embraces the whole of their civil and religious polity; for the system of Mohammed relates more to this world than the next, and was designed, like the law of Moses, for the secular as well as the spiritual direction of his followers. But, taken in its more common and direct sense, it signifies the profession of the five fundamental doctrines on which, according to a traditional declaration of the prophet, the whole edifice of the faith is built. Those five points are: (1) The acknowledgment of the Divine Unity and of the prophetic mission of Mohammed; (2) Observation of prayer; (3) Giving of alms; (4) Keeping the fast of Ramadan; and (5) The performance, if possible, of the pilgrimage to Mecca. They are also often subdivided and enlarged, in order to arrange them more conveniently into the two classes of belief (*iman*) and practice (*din*). The former relates to (1) God; (2) the angels; (3) the Sacred Book; (4) the prophets; (5) the last day; and (6) the divine decrees: the latter to (1) purification; (2) prayer; (3) alms; (4) fasting; and (5) the pilgrimage. To the first article of this creed the Persians and other adherents of Ali add, "Ali is the vicar of God"; and that is the only essential point in which they differ from the Sunnites, or orthodox Muslims, who acknowledge the authority of the four first khalifs. The disputes concerning the succession to the khalifate, or supremacy of the prophet, spiritual and civil, which arose immediately after his death, split his followers, as is well known, into two distinct sects, the Sunnites and the Shiites, who have never since ceased to hate each other with a bitter animosity; but they differ more in the degree of veneration paid to Ali than in any other point; and professing the

same creed, with the exception of one article, they derive their doctrines from the same sources. In their respective rituals, and their interpretation of particular texts, there are many minor differences; but both agree in superadding a traditional to the written law of Mohammed, and both have sanctioned that departure from the original simplicity of his doctrine, the re-establishment of which was the professed object of the Wahabees. See MOHAMMED.

Island, a body of land entirely surrounded by water. Islands are of very different extent and surface, and some are so large that authors have doubted whether they should be called continents, as Australia; this, however, is a mere matter of definition. The great masses of land forming the Eastern and Western Continents are in reality islands. The following table shows the relative mainland area of the largest islands:

ISLANDS	Area in sq. m.	ISLANDS	Area in sq. m.
New Guinea	303,000	Iceland	40,300
Borneo	284,000	Mindanao	37,000
Madagascar	227,000	Ireland	32,600
Sumatra	162,000	Haiti	28,800
Honshu	86,500	Tasmania	26,200
Great Britain	83,700	Ceylon	24,700
Celebes	76,500	Nova Zembla — (N. Island)	19,300
New Zealand — (S. Island)	58,500	Tierra del Fuego	18,500
Java	49,000	Nova Zembla — (S. Island)	15,700
Cuba	45,000	Formosa	15,000
New Zealand — (N. Island)	44,500	Hainan	14,000
Newfoundland	40,200	Sicily	9,800
Luzon	40,000	Sardinia	9,000

A cluster of several islands is called an archipelago. The principal clusters in the Atlantic are the West Indies, the Azores, the Canaries, the Hebrides, Orkney, Shetlands, etc. But the great world of islands is in the Pacific, and some modern writers consider them as forming a fifth division of the world, including the Eastern Archipelago, Polynesia, and Australia, to which they have given the name of Oceania. A large island is a continent in miniature, with its chains of mountains, its rivers, lakes, and is often surrounded by a train of islets. The rivers of islands are in general little more than streams or torrents, and the smaller islands are often uninhabitable from want of water; but they serve as haunts and breeding-places of innumerable sea-birds. There are islands in rivers and lakes as well as in the sea. In rivers they are often formed by the division of the stream into various branches, and often by accumulations of earth brought down and deposited around a rocky base. Examples are not wanting of floating islands, which are formed by the roots of plants and trees interlacing with each other, and thus constituting a support for deposits of successive layers of earth. Islands have been grouped into the two distinct classes of continental and pelagic or oceanic islands. Continental islands follow each other in succession along the margin of the continents, and are generally of the same geological structure. Pelagic islands are mostly of volcanic or coral formation. Considerable islands have been known to be suddenly raised up from the sea-bottom by volcanic action, and soon after to have as suddenly disappeared in the ocean. The Pacific contains a great number of low islands having their basis formed of coral reefs, these reefs being produced by the labors

ISLE LA MOTTE—ISLE OF PINES

of innumerable coral-animals or zoophytes. (See CORAL.) Submarine islands, as they have been sometimes called, are immense banks of sand above which there is no great depth of water.

Isle La Motte, Vt., in the northern part of Lake Champlain, the northern point about 8 miles from Rouse's Point, N. Y., on the Canadian border; the southern point about 15 miles north of Plattsburg, N. Y. It is about 7 miles long and 2 miles wide. The island has large marble quarries; some of the stone for Victoria Bridge, Montreal, for Fort Montgomery on Lake Champlain, for the Brooklyn Bridge, and for many other structures and buildings came from those quarries.

This island was a frequent resort for the Algonquin and Iroquois Indians; at the south end was once an Indian village. It was discovered by Samuel de Champlain in July 1609 and was named after a French officer, Sieur La Motte. In 1665 a wooden fort called Fort Sainte Anne was built on the south shore. The 'Jesuit Relations' contain numerous references to Fort Sainte Anne, Isle La Motte, and the visits made to this island by the early missionaries. (The chapel of Sainte Anne, erected near the ruins of Fort Sainte Anne, was consecrated 16 July 1893 by Bishop De Goesbriand of the diocese of Burlington, and it is now a place of pilgrimage.)

On 24 Aug. 1690, Capt. John Schuyler and his company stopped at Fort Sainte Anne on their return from an expedition into Canada. The island was included in the grant made in 1733, by M. de Beauharnois, then governor of Canada, to Sieur Pean, major of the town and castle of Quebec, and in the French seignory granted to Sieur Pedon, councillor in the superior council of Quebec in 1752, notwithstanding the cession of sovereignty to the crown of Great Britain by the French in the Treaty of Utrecht in 1713 over the Five Nations of Indians, who claimed Lake Champlain and the circumjacent territory. In 1775 Philip Schuyler remained on this island over night and joined James Montgomery near there en route for Quebec, where Montgomery lost his life. In the spring of 1776, when Gen. Sullivan withdrew his forces from Canada, the sick were sent to Isle aux Noix, Point au Fer, and Isle La Motte. On 8 Aug. 1776, Benedict Arnold, after engaging the Indians in the British service on 6 August, at the Bouquet River, fell back to Isle La Motte, where his fleet remained anchored until 19 August, when he sailed south toward Cumberland Head.

Isle La Motte was settled in 1785 by Ebenezer Hyde, Enoch Hall, and William Blanchard and was organized as a town in 1790. In 1814 Commodore Macdonough stationed his fleet for a time north of this island and subsequently sailed to the bay near Cumberland Head, N. Y., where he afterward fought the battle of Plattsburg. Soon after Macdonough's departure from the island, in September 1814, Capt. Pring (British) erected a battery on the west shore of the island about a mile and a half south from Fort Sainte Anne and made efforts to win over the inhabitants to the British cause, but failed. On 8 Sept. 1814, he was joined by Capt. Downie and three days later they sailed away to attack the Americans at Plattsburg, where they were repulsed. They returned to Canada, removing

their munitions of war from the island in their retreat.

The first permanent settlers on the island were from New England. One of those sturdy pioneers was Capt. Caleb Hill, who, at the War of 1812, organized his townsmen into a military company which was known as Company F of the 2d brigade of the 3d division of the Vermont militia. After the departure of Macdonough, Capt. Hill's house was entered one night by a squad of British soldiers, and in his efforts to take them prisoners he was killed. The first ferry established from Isle La Motte to Alburgh, Vt., was by Capt. Hill, and the ferry was maintained by his descendants for three quarters of a century, until the construction of a stone bridge connecting the two islands.

There are on the island two public schools, a Methodist church, town-hall, and a government light-house. The light-house has been in charge of Wilbur F. Hill for nearly 30 years. The island is a favorite summer resort. The strangers who visit the island and vicinity are reminded of the words by which the Indians, in 1609, told Samuel de Champlain about picturesque Lake Champlain, that "It was filled with beautiful islands and with a fine country surrounding it."

Island Number 10, a former island in the Mississippi River, near the northwestern corner of Tennessee, and about 40 miles below Columbus, Ky. Since the Civil War it has been washed away. It was the tenth in a succession of islands lying below Cairo, Ill. Early in 1862, having been fortified by the Confederate, Gen. Polk, it was commanded by Gen. Mackall, who had about 7,000 troops of Beauregard's army. It was bombarded for three weeks by Commodore Foote, commanding seven Federal gun-boats, and surrendered 7 April 1862. The evacuation was forced by Pope with a large land force. He, under cover of a vigorous fire from two gunboats, which had run past the island by night, brought his men across the river in transports. The defenders of the batteries fled, and were pursued into the swamps. Over 6,000 prisoners were taken, together with an immense quantity of ammunition and supplies. The Federal forces lost only a few men. Consult the Century Company's 'Battles and Leaders of the Civil War,' Vol. I.

Isle of Man, in the Irish Channel, the largest island in the English seas. The principal towns are Douglas, Castletown, Ramsey, and Peel. Castletown is the ancient capital, but Douglas (pop. 15,719) is the chief town and the seat of government, which is "home rule" under a lieutenant-governor, who, with council and House of Keys of 24 members, makes up the Tynwald Court. The Manx people are a distinct Celtic nationality. Their language and old customs are rapidly disappearing. Area, 220 square miles. Pop. (1900) 55,668.

Isle of Pines (*Isla de Pinos*, *es'lā dā pē'-nōs*), a small island belonging to Cuba, 40 miles southeast of Pinar del Rio. In 1900 the United States gave unofficial expression to the policy of its acquisition as a coaling station. It has an area of about 840 square miles. It is in effect two islands connected by a marsh, the one on the north being somewhat broken by hills, the one on the south low, flat, and sandy. The climate is healthy, the soil fertile and the min-

ISLE ROYALE—ISOLATION

eral resources extensive. For administrative purposes the island is a municipal district of the province of Havana. There are large marble quarries here. Cattle raising is the chief occupation of the inhabitants. Pop. (1900) 3,199.

Isle Royale, *île-rl* (Fr. *île rô-yâl*), an island in Lake Superior, within the state boundary of Michigan. It is 45 miles long, 9 miles wide and has an area of 229 square miles. Valuable deposits are found here.

Isle of Wight, *wit*, the second largest island in the English seas, near the Hampshire coast. It is four miles in breadth, but only a mile in width on the west, between Hurst Castle and Cliff End, while it expands to seven miles between Southsea and the Foreland on the east. In shape the island is an elongated rhomboid. Its extreme length, from the Foreland to the Needles, is about 23 miles, and its extreme breadth, Cowes to St. Catharine's Point, is about 13 miles. The late Queen Victoria had a residence here. The area is calculated at 145 square miles. Pop. (1901) 82,000.

Isles of Shoals, a group of eight barren islands in the Atlantic Ocean, near the New Hampshire coast, 10 miles southeast of Portland, Maine, from which a daily steamer plies during the summer months. The three principal islands are Appledore (400 acres); Star (150 acres), and White (55 acres). There is a revolving government light on the last named, 87 feet above the sea. On Star and Appledore islands are several large hotels for summer visitors who find sea air, boating and fishing here. A few fishermen are numbered among the permanent inhabitants.

Islip, N. Y., town in Suffolk County, on Long Island; on the Long Island railroad, 44 miles east of New York. The town comprises several small villages and covers an area 20 miles long and 10 miles wide. Here are the Manhattan State Hospital for the Insane, Saint Joseph's Convent (Roman Catholic), and a large fish hatchery, owned by the State. The town is popular as a summer resort and has many fine hotels along the shores of Great South Bay. The Fire Island lighthouse, 166 feet high, is located eight miles from the mainland. Blue Point oysters are shipped from the town in large quantities. The government is vested in a town supervisor and town board, elected every two years. Pop. (1900) 12,545.

Isocrates, *i-sôk'ra-têz*, Greek orator: b. Athens 436 B.C.; d. there 338 B.C. His principal teachers were Tisias, Gorgias, Prodicus, and Protagoras. On account of his weak voice and natural timidity he was reluctant to speak in public, but gave lessons in the art of eloquence, and made orations for others. He thus made considerable profit, for he received twenty talents (\$14,375) for a speech that he wrote for Nicocles, king of Cyprus. He was the first who saw the value of oratory in public life. By basing it on sound moral principles he rescued it from the abuses of the Sophists. He was distinguished for a polished style and a harmonious construction of his sentences. The composition, revision, and repeated polishing of his speeches occupied so much time that he published little. His celebrated panegyric on Athens 'Panathenaicus' employed him 10, or according to others, 15 years. As all his speeches were

modeled after the same pattern, their sameness excited weariness, although his subjects were the most important points of morals and politics. His patriotism was sincere, and his desire for the freedom of Greece so intense, that he starved himself to death in his ninety-eighth year from grief at the battle of Cheronea, "fatal to liberty." In Plutarch's time 60 orations went under his name, not half of which were, however, deemed genuine. Twenty-one now remain, of which the principal are the 'Panegyricus' (an oration in which he exhorts the Greeks to concord, and to war against the Persians) and the 'Panathenaicus' (in which he dilates on the services rendered by Athens to Greece).

I"sodimor'phous Series. See ISOMORPHISM.

Isoetales, *i-sô-é-tä'lëz*. See FERNS AND FERN-ALLIES.

Isolation, in evolution (q.v.), the separation or segregation of any set of animals in a particular area, so that incipient varieties or species are prevented from breeding with the parent species of adjoining regions. Through such isolation the swamping or leveling effects of free intercrossing, or mixing with allied varieties or incipient species, are prevented. As a consequence, variations or nascent species become fixed or localized, being prevented from spreading by some geographic or topographic barrier, with the result that there are many thousands of local races, varieties and species; indeed, probably over half of the number of known species are such forms. Not only species, but genera and higher groups are thus isolated. Thus the marsupials of Australia are, with one or two exceptions, confined to that continent, the connection once existing with Asia having been cut off. In one sense natural selection, or the inbreeding of the fittest, is a form of isolation, as also is preferential mating (q.v.) and also those cases when animals breed at slightly different seasons. What Weismann calls Amixia is substantially the prevention of free intercrossing by the geographical isolation of a part of the individuals of a species from their parent stock. Romanes insists that "without isolation, or the prevention of free intercrossing, organic evolution is in no case possible," and he claims that isolation "has been the exclusive means of modification, or more correctly, the universal condition to it."

Examples of Isolation.—These are found among cave animals (q.v.) where animals confined to the nether world, living in total darkness, are prevented from breeding with their ancestors of the upper world. The deep-sea fauna is another such assemblage, living in gloom and in water at the freezing point, although at the surface the winter temperature of the sea may be 80-85° F. Other examples of the result of isolation are the assemblage of animals peculiar to certain islands, to basins walled in by mountain chains, valleys, deserts, and Alpine summits. Interesting cases of isolation on islands are the gigantic moa birds of New Zealand; the local species of birds confined to the different islands of the Galapagos archipelago, also the land shells living in the different valleys of Oahu, one of the Hawaiian Islands.

Another form of isolation Romanes calls "physiological selection," though Seeböhm suggests that physiological isolation would be a better term. The first to call attention to the

ISOMERISM

value of isolation was Lamarck, while Wagner has shown the great value of migration and the intervention of geographical barriers in the formation of species.

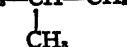
Isomerism (Greek, "having equal parts"). Chemists formerly assumed that two bodies must be identical in chemical nature, in all respects, provided they consist of the same elements, combined in the same proportions. This view was long ago found to be untenable, and many substances (mostly compounds of carbon or nitrogen) are now known, which exhibit widely different properties, although possessing the same empirical formula. Bodies which possess this peculiarity are said to be "isomeric" with each other, and the property itself is called "isomerism." In its broadest sense, isomerism may be regarded as embracing (1) polymerism, (2) metamerism, (3) isomerism in the narrower sense, and (4) geometrical isomerism.

Bodies are "polymeric" when they have the same percentage composition, but have different molecular weights. Acetic acid, $C_2H_4O_2$, and grape sugar, $C_6H_{12}O_6$, for example, are polymeric with each other, because they consist of the same elements, combined in the same proportions, and yet the molecular weight of grape sugar is three times as great as that of acetic acid. In this particular case there is no specially close relation between the polymeric substances, and the polymerism is therefore said to be "accidental." When a close relation does exist between the bodies compared, the polymerism is said to be "generic." Ordinary acetic aldehyde affords a good example of generic polymerism. Aldehyde has the formula C_2H_4O , but when treated with a mineral acid it becomes transformed into paraldehyde, which has the formula $C_6H_{12}O_2$; and the reverse transformation (of paraldehyde into aldehyde) may be effected by the application of heat.

Compounds are said to be "metameric" when they have the same empirical formula, but differ structurally by containing different radicals, joined by a polyvalent element such as oxygen, nitrogen, or sulphur. Ethyl ether and propyl-methyl ether, for example, both have the empirical formula $C_4H_{10}O$; but ethyl ether contains two ethyl radicals, united by an oxygen atom, and propyl-methyl ether contains a propyl radical and a methyl radical united by oxygen in the same manner. Thus these two metamerous bodies have the structural formulae $C_2H_5 > O$ and $C_2H_5 > O$, respectively. Metamerism is manifested, most commonly, by the ethers, esters, and amines.

Isomerism in its narrower sense, or "true isomerism," embraces those cases in which the bodies compared have the same empirical formulae, but have different structural formulae, and do not (like metamerous bodies) consist of definite carbon radicals united by oxygen, sulphur, or nitrogen. True isomerism may be of two kinds: (1) "nucleus isomerism," and (2) "isomerism of position." The hydrocarbons afford good examples of both kinds of true isomerism. The paraffin known as propane, for example, has the empirical formula C_3H_8 , and the structural formula $CH_3-CH_2-CH_3$. Propane may be converted into butane by replacing one of its

hydrogen atoms by the methyl radical, CH_3 ; but the substitution may be made in two essentially different ways, according as the hydrogen that is replaced is attached to the interior carbon atom, or to one of the terminal ones. In the latter case the structural formula of the new substance is $CH_3-CH_2-CH_2-CH_3$, and the substance itself is known as "normal" butane. If the hydrogen that is replaced is attached to the interior carbon atom, a different substance, known as "isobutane" and having different properties from normal butane, is formed; its structural formula being



These two substances,—normal butane and isobutane—are said to manifest "nucleus isomerism," since they differ by the mode of arrangement of their fundamental carbon chains. As the number of carbon atoms in a compound increases, the possibilities of nucleus isomerism becomes enormous. Thus the general empirical formula of the saturated fatty hydrocarbons (or paraffins) is C_nH_{2n+2} . We have seen that in the case of butane (for which $n=4$) two nuclear isomers are possible. If the same kind of reasoning is applied to the higher members of the series, regarding each member as derived from the preceding one by the substitution of a methyl radical (CH_3) for a hydrogen atom, we shall find that there are 3 pentanes ($n=5$) possible: 5 hexanes ($n=6$); 9 heptanes ($n=7$); 18 octanes ($n=8$); 35 ennanes ($n=9$); 75 decanes ($n=10$); 159 hendecanes ($n=11$); 355 dodecanes ($n=12$); and no less than 802 tridecanes ($n=13$).

In that kind of true isomerism which is called "isomerism of position," the isomeric bodies contain substituted atoms or radicals, which occupy different positions in the main chain. Thus a paraffin may be converted into an alcohol by substituting a hydroxyl radical (OH) for one of the hydrogen atoms, and the resulting alcohol will have different properties according to the position of the hydrogen atom that was replaced. For example, four butane alcohols are possible. In normal butane, the structural formula of which is given above, the hydroxyl radical may be substituted for one of the terminal hydrogen atoms, in which case an alcohol is obtained which has the structural formula

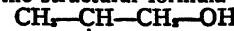


and is known as "normal primary butyl alcohol." If the hydroxyl is substituted in the place of one of the interior hydrogen atoms, an alcohol is obtained which has the structural formula



and is known as "secondary butyl alcohol."

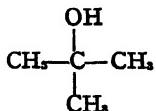
Proceeding, now, to the consideration of isobutane, we note that two essentially different substitutions of the hydroxyl radical are here possible. We may replace a hydrogen atom in one of the three CH_3 groups, or we may replace the one in the CH group. In the first case the alcohol has the structural formula



and is known as "isopropyl butyl alcohol":

ISOMORPHISM—ISTHMIAN CANALS

and in the second case it has the structural formula



and is known as "tertiary butyl alcohol." All of these four alcohols have been actually prepared. (For isomerism of position as manifested in the aromatic compounds, and for the nomenclature used in distinguishing the various isomers that those compounds can exhibit, see AROMATIC COMPOUNDS.)

Certain compounds are known which possess not only the same empirical formula, but the same structural formula also, and yet manifest distinctly different properties, either chemically or physically. Fumaric and maleic acids (see FUMARIC ACID) are examples of this. In such cases the provisional hypothesis is made, that the geometrical structures of the molecules of the two substances are related to one another in something like the same manner that the image of an object in a mirror is related to the object itself, and the isomerism is said to be "geometrical." (See STEREO-CHEMISTRY.)

With reference to isomerism in general, consult Hjelt, 'Principles of General Organic Chemistry'; Lothar Meyer, 'Modern Theories of Chemistry.'

Isomorphism, identity of crystalline form. Isomorphous bodies can form homogeneous mixed crystals; and each one is capable of growing in a saturated solution of the other, fresh crystals being gradually amassed around the original body as a nucleus. Carbonates of calcium, known as calcite; of magnesium, iron, manganese and zinc (magnesite, siderite, rhodochrosite, smithsonite) all are of the same class in crystallography (q.v.). The presence of the same chemical elements of composition in substances does by no means imply isomorphism and substances of very varying components may yet be isomorphous. The isomorphous elements in isomorphous salts, as, for instance, the metals, are generally of the same or related groups of elements. Dimorphous substances, that is, those which form crystals of more than one kind, are often connected by a third dimorphous substance, such as carbonate of lime in the case of calcite and aragonite, and form a group known as isodimorphous substances. See CRYSTALLOGRAPHY.

Isopoda, i-sóp'ō-dá, an extensive and varied group of *Crustacea* (q.v.) usually ranked as a suborder of the *Arthrostraca* or sessile-eyed *Malacostraca*. The body is broad and flattened, and either short or elongated; the carapace is little developed; the thorax long with seven free segments, each bearing a pair of walking limbs; the abdomen more or less shortened and bearing lamellar branchial appendages. The *Isopoda* are classified in seven tribes and more than 30 families, embracing an enormous number of species. They vary greatly in form and mode of life but all are of relatively small size and retiring habits. The vast majority are marine, but a few are inhabitants of fresh water or terrestrial; the latter are familiar to everyone under the names wood-lice and pill-bugs. Most of the marine forms live a free life but conceal themselves in crevices or among

sessile animals and plants, others bore into wood, some, as the gribble and its allies, being destructive to piling; many are commensal or parasitic, among the latter being the *Cymothoidæ*, which infest fishes and whales, and the greatly degenerated *Bopyridæ*, which live in the branchial chamber of prawns and similar crustaceans. The group is traceable in fossil forms as far back as the Upper Carboniferous. Consult Packard, 'Zoology' (1887); 'Richardson, 'Key to Isopods of North America,' in Proceedings United States National Museum, Vols. XXI. and XXIII. (1899, 1901).

Isopondyli, i-sô-spônd'i-li. See ICHTHYVOL-

OGY.

Ispahan, i-s-pä-hän', or *Isfahan*, important city and former capital of Persia, 210 miles south of Teheran, in the midst of an extensive plain watered by a broad river. In the time of Chardin the walls were 24 miles in circuit, and contained 162 mosques, 48 colleges, 1,802 caravansaries, and 273 public baths, and the population was then estimated at 600,000. A great part of the city is at present a mass of ruins. Under the caliphs of Bagdad it became the capital of the province of Irak. Being situated in the centre of the empire, and surrounded by the most fertile territories, it soon became a place of great population, wealth and trade. In 1387 it was taken by Tamerlane and the citizens were given up to indiscriminate massacre, and 70,000 are said to have perished. In 1722 it was taken by the Afghans; but in 1727 it was retaken by Nadir Shah, since which it has not been a royal residence. The great palace built by Shah Abbas is said to have been five miles in circuit, a great part of which space, however, was laid out in ten gardens, adorned with summer houses. The square called Maidan Shah was one third of a mile in length, and was formerly encircled by a canal bordered with plane-trees; but all vestiges of both are now obliterated. The streets are narrow, winding, irregular, unpaved, and very dusty. When Ispahan was in its prosperity its suburbs were distinguished for their extent and beauty. The manufactures of the city are still extensive, including trinkets, fire-arms, sword-blades, glass, and earthenware. The textile fabrics range from the most expensive velvet and satin to the coarsest nankeen and calico. The present population is about 75,000.

Is'rælites. See JEWS and JUDAISM.

Israels, Joseph, yô'séf ez-rä-äls', Dutch painter: b. Groningen 27 June 1824. He was a pupil at Amsterdam of Kruseman and at Paris of Picot, and established his studio first at Amsterdam and later at The Hague. Having essayed historical painting with no marked success, he turned his attention to genre work. He found his subjects among fisherfolk and the humbler classes, whose existence, particularly in its more serious or tragic phases, he depicts in a style likened to that of Millet. Among his canvases are: 'Awaiting the Fishing Boats'; 'Alone in the World'; 'Nothing More'; 'The Struggle for Existence'; 'On the Dunes.' He published 'Spanien, eine Reiseerzählung' (1900). Consult the study by Liebermann (1901).

Isthmian Canals, American. The plan of uniting the Atlantic and Pacific Oceans by a

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great ship canal has been a dream of navigators for several centuries, almost in fact since the days of Columbus, for as early as 1581 the first survey was made to determine the feasibility of connecting the two oceans. In that year, in obedience to instructions, Capt. Antonio Pereira, governor of Costa Rica, organized an expedition and explored a route by way of the San Juan River, the lake, and the rivers emptying into Gulf Nicoya, Costa Rica. In 1620 Diego de Mercado submitted to King Philip of Spain an elaborate report in favor of the construction of a canal over that route which is known as the Nicaragua route. The Panama canal project was conceived later, and other projects were advanced, one of which was the bold conception of James B. Eads, an American engineer, to construct at Tehuantepec a railroad which would be able to carry the largest ships from ocean to ocean. The scheme of connecting the two oceans has possessed a fascination for men of science and an intense interest for men of commerce ever since it was proposed. A number of surveys of the Panama and Nicaragua routes were made during the past half century, but it may be said that not till 1879 was the first positive step taken toward the realization of the project on which so much thought had been expended. In May of that year an International Congress was convened in Paris by M. Ferdinand de Lesseps to discuss the plan of cutting a canal through the Isthmus of Panama. The congress adopted a plan which had been prepared previously by M. de Lesseps, and immediately following that action the Panama Canal Company was formed. The company secured from Lieut. Lucien Napoleon Bonaparte Wyse of the French navy the concession which he had obtained from the United States of Colombia. After the concession had been secured by the company, a commission, known as the De Lesseps Engineering Commission, was sent to Panama to make surveys and prepare estimates of cost. The commission estimated that a canal could be made for \$43,000,000 francs. De Lesseps reduced these figures to 600,000,000 francs, or \$120,000,000, and announced that a *canal à niveau*, or tide level canal, could be completed for that sum. So confident was he of the accuracy of his calculations that he invited men of prominence to attend the opening of the canal, which he set for 1888.

On 21 Feb. 1881 the first detachment of canal employees arrived at Colon. Surveys were made, and the building of camps, hospitals, and other necessary buildings followed. In 1882 the Panama Canal Company purchased the Panama railway. Interest charges accumulated between 1882 and 1888, while nothing like the progress on the canal which had been anticipated had been made. In the autumn of 1888 further borrowing became impossible, and then came a crash which shook the financial world. On 1 Jan. 1889 the company was forced into liquidation. This event created a ferment throughout France, no less than 800,000 French shareholders having been induced to invest in the stock of the company, largely through the appeals which had been made to their patriotism. A receiver was appointed by the Court of the Seine with unlimited powers. In 1890 the receiver sent a commission of French and other engineers to Panama to report on the actual condition of the work. The report was discouraging. Not

more than a fifth of the proposed work had been done; a valuable plant, estimated at \$30,000,000, was rusting away and useless; the tide level at Colon was filling in and the harbor was shallowing, owing to the cut.

In 1891 the government of Colombia granted to the Panama Canal Company an extension of 10 years from 1893 in which to finish the contract, provided operations were resumed before February 1893. In November 1892 a member of the French Chamber of Deputies, M. Delahaye, created a profound sensation in Paris by declaring on the floor of the Chamber that the Panama Canal Company had obtained exceptional privileges, which it had used for the purpose of defrauding investors, by the bribery of no fewer than 100 deputies. The demand for an investigation of the charges was of such force and insistence as to be irresistible, and the ministry decided to submit the whole question to a committee. Following this decision, Baron Reinach, a banker accused of being the instrument or agent of much of the corruption of the company, died suddenly, and it was alleged that he had poisoned himself. Amid a popular clamor, such as Paris had not known for many years, the investigation was carried on, and the disclosures before the investigating committee indicated that the operations of the canal company had been slimed with fraud. It was shown that the Panama Company had bribed deputies and journalists on an extensive scale in order to cover up its shortcomings and leave the way open for further imposition.

In February 1893 M. de Lesseps, his son Charles, and some of their colleagues were sentenced to various terms of imprisonment for fraud and bribery. At the time the blow fell M. de Lesseps had passed his 80th year. Bitter as was the feeling of the French toward those who were responsible for their loss of money, much sympathy was manifested toward the man who had been the presiding genius of the great enterprise. That he had been knowingly a party to the great fraud which had wrecked the hopes and fortunes of so many worthy persons in France, the public was loath to credit. The sympathy for him took such form that he was not imprisoned. But the great engineer, who had reaped so much glory through the construction of the Suez canal, was unable to withstand the blow which the Panama exposure gave him. He died in November of the year following. At the end of 1893 the only prominent person left in prison as the result of the Panama prosecutions was M. Bailhut, formerly Minister of Public Works.

In 1894 a prominent French engineer professed a scheme by which he claimed the work could be completed in four years at an additional cost of \$110,000,000. A new company was formed, and 300,000 shares were issued. Work on the canal was resumed under French auspices. Early in 1895 a strike occurred among the laborers on the canal, and the methods of the new company were criticised severely by the stockholders. Another scandal such as had attended the operations of the original company was feared, but developments showed that the suspicions were unwarranted. Nevertheless, the confidence of the French public in the ultimate success of the enterprise had been shaken to such extent as to make it manifest that the com-

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pletion of the canal under French auspices was no longer a possibility.

That being the situation, those who were bound up in the enterprise turned toward America for relief. The United States up to that time had concerned itself, as far as the building of a canal was considered, solely with the Nicaragua route. The first survey for a canal at Nicaragua under American auspices was made in 1852 by Col. A. W. Childs. The project as outlined by him has been the basis for all subsequent locations. A second survey was made in 1872 by a party under the charge of Commander E. P. Lull of the United States navy. Eleven years later another survey was made by A. G. Menocal, a civil engineer, also of the United States navy. In 1889 the Maritime Canal Company was organized to construct the Nicaragua canal on the lines of the Menocal project. As there was, for a decade following, considerable enthusiasm over the Nicaragua canal scheme in the United States, the project of the Panama Company enlisting American capital, were anything but promising.

Nevertheless an auxiliary American company was organized. In the investigation of the French company's affairs which was made by the new American company, it was ascertained that of the \$156,400,000 expended by the original company only \$88,600,000 had been expended legitimately on the excavation and construction, the rest having gone in bribery and corruption. The second French company was started with a capital of 65,000,000 francs, about one half of which was expended cautiously on construction in four years. The second French company had abandoned the original plan of constructing a tidewater canal. Its plans contemplated the construction of a canal with locks.

The history of the isthmian canal project shows that faith in the Nicaragua route as the most practicable suffered a steady decline. This decline was due more than anything else, perhaps, to the uncertainty of the cost of carrying out the project. The first estimate of the Maritime Company was \$67,000,000. After doing more or less work on the canal the Maritime Company ceased operations in 1893 for lack of funds. In 1895 Congress appointed the Ludlow Commission to examine and report on the Maritime Company's project. This commission placed the cost of the canal's completion at \$133,472,893. The Walker Commission, appointed subsequently, increased the estimate to \$140,000,000.

Up to the outbreak of the Spanish-American war the project of constructing an isthmian canal, while acquiesced in by the general public in the United States, had received ardent advocacy only in quarters where a special study of the subject had been made. But at the commencement of that conflict the people of the United States received an impressive object lesson on the need of a canal. That lesson was the historic trip of the battleship Oregon. With the declaration of hostilities American attention was absorbed by the possibility of the Spanish fleet under Admiral Cervera making a sudden attack on some one of the important cities of the Atlantic coast. At that time the Oregon, a newly constructed battleship, was on the Pacific station. It was considered desirable to have the ship added to the strength of the Atlantic fleet. Orders were sent to her commander, Capt.

Clark, to bring her around Cape Horn, using all speed possible. The American people watched with anxiety the famous voyage. It furnished an argument for the construction of an isthmian canal more effective than a century of discussion.

But coincident with the making up of the American mind that a canal must be built, there came the conflict of opinion as to the choice of routes. Those who were interested in the Panama enterprise were quick to see the opportunity opened to them. When the commission that was appointed by President McKinley in 1899 to examine the American isthmus at every available point in order to determine the most practicable and feasible route for a ship canal went to Paris to examine the plans of the Panama Company, the company, realizing the improbability of its being able to raise sufficient funds in France to carry the enterprise to a successful conclusion, decided to face competition with the Nicaragua project before the Congress of the United States. At a meeting of the directors it was decided to transfer all of the property of the company, its rights and powers, together with those of the American auxiliary company, to a new American company. That company was organized under the laws of the State of New Jersey, with the title of the Panama Canal Company of America. The capital was fixed at \$30,000,000 and the company was authorized to increase the amount if necessary. The arrangement which it made with the French company in taking over its rights, was to pay the shareholders of that company partly in money, but mainly in shares of the American company. The French company retains only an equity in the shape of a lien on a specified percentage of the profits remaining after the payment of all operating expenses and fixed charges and a dividend to the stockholders of the new company. An international commission of French, German, Russian, English, and American engineers, consulted by the French company in drawing up its plans, estimated the cost of completing the Panama canal at \$102,000,000, if the two locks were made of a certain width, and \$125,000,000 if the locks were wider. The extended concession from the Colombian government runs till 31 Oct. 1910, a bonus of \$15,000,000 having been paid to secure the extension.

After the American company was organized and the proposition for a transfer was brought definitely before the French directors, so much opposition was developed to the surrender of an enterprise that had absorbed so much French enthusiasm and entailed such sacrifices on the French people that the directors were unwilling to shoulder the responsibility of carrying out the arrangement, and all resigned. The trustees of the De Lesseps company, in particular, were reluctant to sanction the total transfer of the entire management and control from France to the United States. A new board of directors was chosen, which continued the negotiations with the American company, and the transfer was made. Congress ultimately decided on the Panama canal route as the most feasible and practicable and passed the bill under which President Roosevelt was authorized to acquire the American Panama Canal Company's rights.

The price fixed that the United States government should pay the Panama Canal Company of America for its rights and privileges was \$40,000,000. The cost of the completed canal

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was estimated at \$184,233,358. Thus, the passage of the Act of Congress, approved 28 June 1902, "To provide for the construction of a canal connecting the waters of the Atlantic and Pacific Oceans," was the first decisive action taken by the United States Government to secure an isthmian canal. The second important step was taken 17 March 1903, when the Senate ratified the treaty that had been negotiated with Colombia to secure for our country the concession necessary for the canal's construction and management.

The law of 28 June 1902 authorized the President to buy out the New Panama Canal Company, negotiate a treaty with Colombia for a concession, and proceed by means of a commission with the construction of the Panama Canal. If unable to secure a satisfactory title to the property of the Panama Canal Company, or "to obtain by treaty control of the necessary territory from Colombia," the President was empowered to negotiate with Costa Rica and Nicaragua for a concession, and having secured the privileges desired, to construct the canal by the Nicaragua route. The purchase price to be paid the Panama Canal Company was not to exceed \$40,000,000 (the valuation which the Isthmian Canal Commission had placed on the company's entire assets, including the Panama Railroad), and before paying over the money to the company the President was required to assure himself of the validity of the title to the property to be transferred and to await the exchange of ratifications of a satisfactory treaty with Colombia.

The first duty of the President was to investigate the title held by the Panama Canal Company and to determine whether it was a good one, free of encumbrance, and transferable to the United States. The attorney-general was promptly instructed to make this investigation, and his elaborate opinion, together with the data upon which his opinion was based, was laid before the President 25 Oct. 1902. The subject entrusted to the attorney-general was one of great importance, and his report is fortunately comprehensive, thorough, and entirely convincing.

Before the attorney-general made his inquiry, the validity and transferability of the Panama Canal Company's title had been investigated by the Isthmian Canal Commission and by the Senate committee on Interoceanic Canals. One of the important duties imposed upon the Canal Commission was to "ascertain what rights, privileges and franchises" were held by the Panama Canal Company, and "the cost of purchasing all of the rights," and of placing the canal under the control of the United States. Accordingly, one of the five committees to which the several departments of the commission's investigation were committed was the Committee on Rights, Privileges, and Franchises. The report of the Isthmian Canal Commission contains a full historical and analytical discussion of the subject of concessions. The relations of the original Panama Canal Company to the New Panama Canal Company were set forth, and the opinion expressed that the New Panama Canal Company was able to sell its concession and property to the United States, provided the representative of the rights of the old company, the "liquidator," gave his approval of the sale, and united with the new company in the offer to

sell. Shortly after this report was made the New Panama Canal Company offered to sell out to the United States, and the liquidator gave his consent to the sale. The Commission prepared a supplemental report dealing with this offer, and came to the conclusion that the offer thus made was one that the New Canal Company was competent to make, and that Congress ought to accept.

The chairman and a majority of the Senate committee on Interoceanic Canals disagreed with the conclusions of the commission, but the report of the majority was criticised by the minority members of the committee in an ably written report that supported the conclusions reached by the Canal Commission. The latter was accepted by the Senate.

The treaty granting to the United States the concession and rights necessary for the construction, operation, and control of the Panama Canal was signed by Secretary Hay and the Colombian chargé d'affaires, 22 Jan. 1903, and ratified without change by the United States Senate, 17 March. It is a lengthy treaty, containing 28 articles, but is remarkable for the conciseness and directness with which each provision is stated. The Canal Commission did not consider it necessary for the United States to acquire sovereignty over the territory adjacent to the canal. The desirability of our country's having the sole and undivided ownership and control of the canal when constructed was emphasized, and the recommendation was made that the compensation to be paid by the United States should be definitely fixed either as a single payment or as a predetermined annual payment, or as a combination of these two methods. The treaty authorizes the New Panama Canal Company to sell out to the United States; exempts the Panama Railroad Company from its financial obligation to Colombia, and gives the United States a lease for a period of 100 years, renewable at the option of the United States, of a strip of land 10 kilometres wide across the Isthmus of Panama. The United States not only recognizes the sovereignty of Colombia over this leased strip, but "disavows any intention to impair it in any way whatever, or to increase its territory at the expense of Colombia or of any of the sister republics in Central or South America." The United States secures the right to construct the canal and harbors, to establish free ports at the termini of the canal, to maintain hospitals and drainage and sanitary works along the line of the canal and its dependencies, and to install waterworks and a sewerage system in Colon and Panama, with the authority to "collect equitable water rates during 50 years." Colombia agrees not to cede or lease to any foreign power any territory in the Department of Panama, and the United States guarantees that no country shall be allowed to seize such territory.

It is provided that the canal shall be neutral in perpetuity, in conformity with the treaty of 18 Nov. 1901, between the United States and Great Britain; but the United States secures the right to protect the canal. The new treaty in no wise limits the rights of the United States under the treaty of 1846-8 with New Grenada, by which we guarantee the neutrality of the isthmian transit route and the sovereignty of Colombia.

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The canal is to be a neutral highway for the commerce of the world. The United States has been in favor of the principle of neutrality for more than half a century. The only serious difference of opinion has been in regard to the question whether the principle of neutrality should be enforced by an international agreement, such as the treaty of Constantinople concerning the Suez Canal, or whether the United States should be the sole guarantor of the neutral use of the waterway by the people of all nations. The question has been settled in the best manner. The United States stands responsible for the maintenance of the principle of neutrality, having given a pledge to Great Britain and Colombia.

In the summer of 1903 came the unexpected rejection of the treaty by Colombia, and this put a new phase upon the question. It is possible that this act of Colombia may lead to the reopening of final negotiations with Nicaragua and Costa Rica for the construction of a canal by the Nicaragua route. At least there has been much discussion of the old problem of the two canals. The President is empowered to negotiate with those governments if unable to secure a satisfactory title to the property of the Panama Canal Company. The two routes, Panama and Nicaragua, are both practicable and feasible from an engineering standpoint. In 1903 the 'Scientific American' published a comparison of the two routes. This comparison, based upon the reports of the International Commission on Panama and of the Nicaragua Canal Commission, offers a concise and clear résumé of the question. For the bearing on the question of the successful revolt of Panama from Colombia in November 1903, see PANAMA.

The two canals have certain features in common. In both the greatest problem is the maintenance of the summit level and the control of the flood waters of rivers which are subject to extremely heavy freshets. In both cases the plan determined upon seeks to make the one difficulty cancel the other, the flood waters of the rainy season being stored by the erection of large dams across the course of the rivers, the dams being associated with spill-ways, or waste-weirs, by which the impounded waters may be regulated between predetermined maximum and minimum levels.

Panama.—The route of the Panama Canal extends from the six-fathom line in Colon Harbor on the Atlantic to the six-fathom line off Panama on the Pacific, a distance of 49 miles. The physical difficulties consist of the Culebra cut through the continental divide near the Pacific, and the floods of the Chagres River, which latter flows down from the northeast, intercepts the line of the canal at about its centre, and coincides more or less with the general route of the canal from the point of interception to its Atlantic terminus. The problem is to be solved by cutting a tide-level canal for the first 16 miles from the Atlantic to Bohio, where a dam will be thrown across the Chagres River, the dam to be of sufficient height to form a great lake in the valley of the Chagres, whose maximum elevation will be 90 feet above mean sea-level. Allowing for the greatest possible variation due to continued drought or to heavy freshets, the level of the lake will be maintained between the extremes of 82 feet as a minimum and 90 feet as a maximum level above the sea at mean tide. The surplus waters of the rainy season will be discharged over a weir 2,000 feet in length, which will be built not far from the Bohio dam, the waste waters being conducted to the Atlantic partly by the Chagres River and partly by artificial channel. At Bohio will be located a double-lift lock with a total maximum lift of 90 feet. The line of the canal traverses the Bohio lake thus formed for a distance of about 14 miles, or

until it reaches Obispo, where there will be placed a set of gates 100 feet wide, the purpose of the gates being merely to retain the waters of Lake Bohio should it at any time be desirable to drain off the waters of that portion of the summit level lying beyond the gates. Passing through the gates the canal enters the Culebra section, which consists of a great cut through the continental divide. This section is about eight miles in length, and at the Pacific end of it are the Pedro-Miguel locks. Then follows a level 1.33 miles in length, which leads to the Miraflores locks, by which descent is made to tide-level on the Pacific. From the Miraflores locks to the six-fathom line on the Pacific is a distance of 8.5 miles.

Nicaragua.—Although the route of the Nicaragua Canal is nearly four times as long as that at Panama, the cost of its construction, while greater by about \$6,000,000, is nothing like proportionate to its greater length. Topographically considered, the controlling features at Nicaragua are the existence of a great deep-water lake near the Pacific, and its connection with the Atlantic Ocean by the Rio Grande, a river of considerable size and discharging in the rainy season an enormous volume of water. Starting from Greytown on the Atlantic, the canal will be excavated generally along the edge of the delta formed by the San Juan River until it enters the river channel at a distance of 46 miles from the sea. Three miles further down the river, at Conchuda, it is proposed to build a great dam across the San Juan River, whose crest will be of sufficient height to raise the surface level of the impounded waters to a maximum elevation of 110 feet above mean sea-level. The difference of level will be overcome by four locks at various points on this section. This dam will have the effect of canalizing the San Juan River from this point to its point of outflow from Lake Nicaragua, a distance of 49.64 miles. Where the sharper bends of the river occur, cut-offs will be made. The distance across Lake Nicaragua, 70.51 miles, will lie chiefly in deep water; but the approach to the canal at each side of the lake will have to be dredged to obtain the necessary depth of 35 feet. The remaining 17.34 miles of canal from the western shore of the lake to deep water on the Pacific will contain four locks, by which the difference of elevation of 110 feet will be overcome.

SUMMIT LEVEL.

Panama.—The average summit level proposed by the Isthmian Canal Commission for Panama is 85 feet above mean tide. This is to be secured by the construction of a dam at Bohio and a spillway near by, at Gigante, which will be a fixed weir 2,000 feet in length. As a provision against seasons of extreme drought the canal will be excavated to such a depth that the summit level might fall to 82 feet and still leave the requisite depth of 35 feet throughout this section of the canal. The records of the Canal Company and of the Isthmian Canal Commission show that it is improbable these extremes will be reached, or that, if reached, it will be only at very rare intervals.

Nicaragua.—The regulation of the summit level at Nicaragua is a much more serious problem, for the reason that it involves maintaining the level of the extensive Nicaragua Lake, which has an area of between 2,700 and 3,000 square miles, within certain predetermined maximum and minimum levels. It involves, says the report of the Commission, the control of the lake level within such limits "as will never permit the navigable depth of the summit level to be anywhere less than 35 feet on the one hand, nor permit the lake to rise materially beyond a determined elevation on the other. This regulation can be accomplished by the construction of dams across the Rio Grande west of the lake and across the San Juan on the east side, both being designed with suitable water-ways for the discharge of surplus water." The minimum elevation has been fixed at 104 and the maximum at 110. The problem is a stupendous one, and limitations of space prevent any detailed discussion of it here.

DAMS.

Panama.—The Bohio dam is the most important structure on the line of the Panama Canal. The dam proposed by the Panama Company was to have been of clay founded upon a variety of material—hard clay, soft clay, sand, gravel, etc. The Isthmian Canal Commission very wisely decided that for a work of this importance security was a prime object to be aimed at. They decided that a masonry dam founded throughout on rock, or an earth dam with a masonry core going down everywhere to rock, would close the valley effectively and prevent all possibility of seepage. The core-wall-and-earth dam was preferred. The structure, which is to be 2,440 feet in length along its crest, will contain a core wall which will be carried down everywhere to

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rock, the latter being reached in places at a depth of 128 feet below the sea-level. Below elevation—the pneumatic process will be used in construction, and above—30 cofferdams will be used. The cost of this dam will be \$6,369,640, and as it will probably take ten years to build, it will be the controlling feature in the question of time of construction of the canal. Once built, however, it will be a perfectly secure structure for all time.

Nicaragua.—The dam designed by the Commission at Conchuda on the San Juan will be a smaller structure, and the greatest depth to rock will be only 80 feet. The regulation of the surface level will be accomplished by wasteways, vertically-moving gates of the Stoney type being adopted, each giving an opening of 30 feet on the crest of the dam. This discharge will amount to 100,000 cubic feet per second with the water in the pool immediately above it at 104'. The total length of the dam, which will be entirely of masonry, will be 1,271 feet and its cost \$4,000,000.

LOCKS.

Panama.—At Panama there will be but three locks in all, one set at Bohio, with a double lift of a maximum of 45 feet each and a total lift of 90 feet, and two sets at the Pacific end of the summit level—double-lift locks at the Pedro-Miguel and single-lift locks at Miraflores. All of these locks will be on a rock foundation.

Nicaragua.—The ascent or descent from maximum summit level at Nicaragua will be accomplished by eight locks, four on the Pacific side and four on the Atlantic side.

LENGTH AND CURVATURE.

Panama.—The total length of Panama from ocean to ocean is 49 miles, and of this total 22.85 miles is curvature, the total degrees of curvature being 771. The curves are of very large radius and will present no difficulties in the way of navigation, a fact which is commented upon favorably by the Commission.

Nicaragua.—The total length of Nicaragua from ocean to ocean is 186.5 miles, and of this 49.29 miles is in curvature, the total amount of curvature being 2,339 degrees. The greater part of this curvature occurs in the valley of the San Juan River, and owing to the limits imposed by the configuration of the valley, most of the curves are extremely sharp, and must necessarily somewhat hamper navigation, particularly in the case of modern vessels of 600 or 700 feet length. An attempt is made to offset this by providing greater width in the canal on curves. There is no point, unless it be that of shortness in time of transit, in which Panama shows its great engineering and operating advantages over Nicaragua so much as in this matter of alignment.

HARBORS.

Panama.—The Panama Canal is greatly favored in the matter of harbors, which, by the way, are a most essential feature in the successful operation of a maritime canal. Good harbors exist both at Colon and Panama, and with the improvements suggested by the Commission, they will be able to accommodate the largest shipping that seeks the canal.

Nicaragua.—In the matter of terminal harbors, it must be confessed that the Nicaragua scheme is altogether wanting, since they simply do not exist. In 1832 there was a spacious harbor at Greytown with depths of from 18 to 30 feet of water. To-day three-fourths of this harbor is a sandy swamp, and the rest of it is a shallow lagoon with from 6 to 16 feet depth of water. An artificial harbor will have to be constructed both here and at Brito on the Pacific, and the cost of dredging to keep these harbors open will be a permanent charge upon the canal.

TIME OF TRANSIT.

It has been estimated by the Commission that a 400-foot ship would take 11 hours 14 minutes to pass through the Panama Canal, this estimate being based on a speed that varies from 7 miles an hour on curves to 10 miles an hour in Lake Bohio. It is estimated that the same vessel will take 33 hours to pass through the Nicaragua Canal. Suppose that two identical passenger steamers of 18 knots sea speed enter the Atlantic termini at Panama and Nicaragua at 12 o'clock noon, January 1. By the time, 33 hours later, that the steamer at Nicaragua was at the Pacific, the steamer at Panama would be 378 knots distant on the Pacific. This gain, however, would be offset by the saving in distance and time between some of the ports on the Atlantic and on the Pacific.

WORK DONE.

The Commission estimates the value of the work done at Panama, the Panama Railroad, the maps, draw-

ings, etc., at \$40,000,000, while it states that "practically none of the property" representing work done, etc., at Nicaragua "would have any value to-day in the construction of the canal."

COST.

The total cost of completing Panama is estimated at \$144,233,358, while the total cost of building Nicaragua will be \$189,864,062. The Panama Company, however, have offered to sell their properties at the price named by our Commission, \$40,000,000, thus making the cost of the completed Panama Canal \$184,233,358. This renders the completed Panama Canal cheaper by \$5,630,704 at first cost. The Commission, however, say it will cost \$1,300,000 more every year to maintain and operate Nicaragua than it will Panama. This sum capitalized at 4 per cent and added to the cost of constructing Nicaragua, makes the Panama Canal considered as a financial proposition, over \$38,000,000 cheaper in the long run than the Nicaragua Canal.

Isthmian Games, so called because they were celebrated on the Isthmus of Corinth. Here was a famous temple consecrated to Poseidon, near which the Isthmian games were celebrated. On one side of the temple were the statues of the victors in these games, and on the other was a grove of pines. In the temple stood four horses, gilded all over, with the exception of their ivory hoofs: by the side of the horses were two Tritons, the upper parts of which were gilt, and the rest of ivory. Behind the horses was a car, with the statues of Poseidon and Amphitrite, of gold and ivory. Not far from the temple were a considerable theatre, and the stadium, of white stone, in which the games were celebrated. The whole isthmus was sacred to Poseidon, who was thence called *Isthmius*. According to the common opinion the Isthmian games were founded in honor of Palmon or Melicertes, by Sisyphus, king of Corinth. When there was war between the states of Corinth and Athens a sacred truce was concluded, and the Athenians were solemnly invited to attend the celebration of the games. They were celebrated with the same splendor as the Olympian and other public games, in the first and third years of each Olympiad, probably in autumn; the athletic exercises were the same. The victors were at first adorned with wreaths of pine-leaves, but afterward with wreaths of dry and faded ivy. The pine wreaths were afterward resumed. Victory shed a lustre not only over the individual, but over his family and the community to which he belonged.

Istle, is'tl, or Tampico. This structural fibre is produced from several species of small agaves in Mexico, chiefly *Agave heteracantha*, and *A. lechuguilla*. The plants grow wild over a wide area of central and northern Mexico, the centres of the industry being located in the states of Coahuila, Tamaulipas, Nuevo Leon and San Luis Potosi. The fibre is extracted by the peons by hand labor and prepared by rudest methods. The filaments are harsh and stiff, but smooth, and in color a yellowish white, and form an admirable substitute for animal bristles in brush manufacture. Nearly 8,000 tons of the fibre is imported into the United States annually, worth almost half a million dollars. In Mexico the fibre is used for rough cordage and webbing (for saddle girths), and for sacks for the transportation of all kinds of merchandise. A little fibre finds its way into this country to mix with the cheaper cordage fibres, but it cannot amount to very much in the figures of imports. The fibre is derived from the cogolla, or central spike of unopened leaves, these being

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separated by hand and each leaf scraped on both sides with a kind of dull edged knife, in order to release the fibre, which lies just under the epidermis. After drying, the fibre is sold at the haciendas, put up in bundles of about 75 pounds, and transported on the backs of pack animals to the neighboring towns, where it is sorted, baled, and sent by rail to the port of Tampico for shipment, hence the commercial name Tampico. For further information see article on Iotle Fibre in Mexico, Scientific American Supplement, (1902). See CORDAGE: CORDAGE INDUSTRIES: FIBRE; MEXICO.

CHAS. RICHARDS DODGE.

Itacolumite, i-tä-köl'-ü-mit, also known as flexible sandstone, is a mineral curiosity. It is a light colored, laminated-granular quartzite containing besides quartz grains, mica, talc and chlorite. Usually thin bedded, pieces an inch thick or more have considerable flexibility. This property is attributed to the presence of thin laminae of mica, talc, etc. and also to the shape of the sand grains which have interlocking angles, due to a secondary growth of the grains by deposition of silica. Itacolumite is found in Brazil, also at several localities in the southern Appalachians.

Itagaki, Taisuke, ti-soo'kä ē-tä-gä'kë, COUNT, Japanese statesman: b. Tosa province, island of Shikoku, 1838. He received a military education, and in the war of the Restoration (1868) was prominent in the imperial army. From 1871 until his resignation in 1873 he was a privy councillor to the emperor. He then became the centre of a movement for constitutional government which in 1877 addressed to the government a memorial asking for a representative assembly and broaching popular rights. Itagaki aimed at a system based on that of Great Britain or the United States, as opposed to the system based on that of Germany, drafted by the Marquis Ito and promulgated in 1890. But he would have been satisfied at first, it is said, with an assembly which quite excluded the popular element. He organized the *Jiyuto*, or Liberals, the first Japanese political party, which rapidly increased in numbers. In 1878 he became minister of public works, in 1880 minister of the interior, and in 1898 the Liberals united with the Progressists, led by Count Okuma, to form the so-called Constitutional party, which had a large majority in the lower house of Parliament. At the Mikado's request Itagaki and Okuma formed a cabinet, with Itagaki as minister of the interior. The cabinet resigned after six months, and the Constitutional party was separated into its original parts.

Italian Architecture. See ARCHITECTURE: ITALY.

Italic Languages, the languages of ancient Italy, before it had become Latinized by the predominance of Rome. These are generally described as Umbrian, Oscan, Etruscan, and Latin. The three first only survive in some fragments and inscriptions. Thus the Eugubine Tables, seven tablets of brass discovered in 1444 near Eugubium, are engraved with a series of sacerdotal inscriptions in ancient Umbrian. Taken together they contain about 450 lines, reading from left to right, some in Roman, others in Etruscan letters. The most important

fragment of the Oscan language is that inscribed on a bronze tablet discovered in 1793, and called the Bantia Table, from the neighboring city of Bantia. The Oscan Bantine inscription contains 36 lines, and is much more easy to interpret than the Eugubine Tables. The Oscan language was spoken in the south of Italy. Another important monument of Oscan is the Cippus Abellanus discovered in 1685. The bronze tablet of Agnone discovered in 1848 also contains an Oscan inscription. The Etruscan language is most difficult of all to interpret. The most important remains which are known were discovered in the neighborhood of Perugia in the year 1822. The inscription is engraved on two sides of a block of stone, and consists of forty-five lines. The learned are divided about its interpretation. The most copious and important of the legal fragments which exhibit the Latin language in its earliest form are the Twelve Tables (q.v.).

Italy, a kingdom in southern Europe, consisting in the main of a large peninsula stretching southwards between the Adriatic Sea and the western part of the Mediterranean, but also including a considerable portion of the mainland and some of the adjacent islands. It is bounded on the north by the Alps, which separate it from Austria and Switzerland, except at the district lying to the north of Lake Garda, where its frontier does not follow the line of the Alps; on the west by France, from which it is separated along the larger part of the frontier line by the Graian, Cottian, and part of the Maritime Alps, and by the Mediterranean; on the south by the Gulf of Taranto and the Mediterranean; and on the east by the Adriatic and a portion of the Austro-Hungarian Empire. It is comprised between lat. 36° 40' and 46° 40' N. and between lon. 6° 35' and 18° 35' E.

Political Divisions.—For administrative purposes Italy is divided into 69 provinces, which are grouped under 16 departments (*compartimenti territoriali*), some of which consist of only a single province. The provinces are subdivided into circles (in Venetia and the province of Mantua called districts). The following table furnishes a list of the provinces and departments, with the area of each, and the population as estimated 1 Feb. 1901:

PROVINCES AND DEPARTMENTS	Area in sq. m.	Pop. on Feb. 1, 1901
Alessandria	1950	811,833
Cuneo	2882	638,235
Novara	2553	743,115
Torino (Turin).....	3955	1,124,218
PIEMONTE (Piedmont)	11,340	3,317,401
Genova (Genoa)	1582	934,627
Porto Maurizio.....	455	142,846
LIGURIA	2,037	1,077,473
Cagliari	5204	483,548
Sassari	4090	308,206
SARDINIA (Island).....	9,294	791,754
Bergamo	1098	459,594
Brescia	1845	538,427
Como	1091	580,214
Cremona	695	327,838
Mantova (Mantua)	912	311,942
Milano (Milan).....	1223	1,442,179
Pavia	1290	496,969
Sondrio	1232	125,565
LOMBARDIA (L'bardy).....	9,386	4,282,728
Belluno	1293	192,800
Padova (Padua).....	823	443,227
Rovigo	685	221,904
Treviso	960	412,267

ITALY

PROVINCES AND DEPARTMENTS	Area in sq. m.	Pop. on Feb. 1, 1901
Udine	2541	592,592
Venezia (Venice)	934	401,241
Verona	1188	422,437
Vicenza	1052	447,999
VENEZIA	9,476	3,134,467
Bologna	1448	527,367
Ferrara	1012	271,776
Forlì	725	280,823
Modena	987	315,804
Parma	1250	294,159
Piacenza	954	245,126
Ravenna	715	235,485
Reggio nell'Emilia	896	274,495
EMILIA	7,967	2,445,035
Ancona	762	302,172
Ascoli Piceno	796	245,172
Macerata	1087	259,429
Pesaro e Urbino	1118	253,982
MARCA (The Marches)	3,763	1,060,755
Perugia	3748	667,210
UMBRIA	3,748	667,210
Arezzo	1273	271,676
Firenze (Florence)	2265	939,054
Grosseto	1738	144,722
Livorno (Leghorn)	133	123,877
Lucca	558	319,543
Massa e Carrara	687	195,631
Pisa	1179	320,829
Siena	1471	233,830
TOSCANA (Tuscany)	9,304	2,549,142
Roma (Rome)	4663	1,196,909
LATIUM	4,663	1,196,909
Chieti (Abruzzo Citeriore)	1138	370,907
Teramo (Abruzzo Ulteriore I.)	1067	307,444
Aquila (Abruzzo Ulteriore II.)	2484	396,629
Campobasso (Molise)	1601	366,571
ABRUZZI E MOLISE	6,380	1,441,551
Benevento	818	256,504
Napoli (Naples)	350	1,151,834
Salerno (Principato Citeriore)	1916	564,328
Avellino (Principato Ulteriore)	1172	402,425
Caserta (Terra di Lavoro)	2033	785,357
CAMPANIA	6,289	3,160,448
Foggia (Capitanata)	2688	425,450
Bari	2065	827,698
Lecce (Terra d'Otranto)	2623	706,520
APULIA	7,376	1,959,668
Potenza	3845	490,705
BASILICATA	3,845	490,705
Cosenza (Calabria Citra)	2568	465,267
Reggio di Calabria (Calabria Ultra I.)	1221	428,714
Catanzaro (Calabria Ultra II.)	2030	476,227
CALABRIA	5,819	1,370,208
Caltanissetta	1263	327,977
Catania	1917	705,412
Girgenti	1172	371,638
Messina	1246	543,809
Palermo	1948	785,357
Siracusa (Syracuse)	1442	425,507
Trapani	948	368,099
SICILIA (Sicily)	9,936	3,529,799
KINGDOM OF ITALY	110,646	32,475,253

The principal islands belonging to Italy are Sicily and Sardinia; the others include the Lipari Islands, Capri, Ischia, Giglio, Monte Cristo, Elba, etc. Rome is the capital.

Physical Features.—The length of the coast of the mainland of Italy has been estimated at about 1,450 miles, that of the islands of Sicily and Sardinia at about 850 miles; so that the whole coast-line, inclusive of the smaller islands, must amount to about 2,400 miles. It is not much broken. The whole shore of the Adri-

atic presents a comparatively smooth and continuous line, interrupted only by the spur of Gargano, which, by its south side, contributes to form the Gulf of Manfredonia. The largest gulf of all is that of Taranto, in the south. The west coast, though much more indented than the east, is more remarkable for the number, and occasionally for the beauty, of its bays, than for their magnitude. Commencing at the south extremity and proceeding north, the most important which present themselves, in succession, are those of St. Eufemia, Policastro, Salerno, Naples, Gaeta, and Genoa. The eastern shore is generally flat and uninteresting, presenting, particularly along its northern part, a long series of sandy islands and lagoons, which retard the progress of the rivers, dam up their mouths, and, depriving them of a proper outlet, occasion the formation of pestilential marshes. On the west coast the same thing is occasionally seen, but occurs on a large scale only in the Roman territory, where the Pontine Marshes, notwithstanding the proved practicability of draining them, are permitted to spread their poisonous malaria, and convert extensive tracts, of great natural fertility, into almost uninhabitable deserts. But with this very prominent exception, the west coast is considerably elevated, the ramifications of the mountains often stretching down and terminating in lofty cliffs, with a magnificent background of alpine heights. Few countries can boast of possessing scenery of this description equal to that which is exhibited by the Gulfs of Genoa and Naples.

The interior of Italy is finely diversified. The loftiest mountains of the Alps stand on its northern and northwestern frontiers, and shelter it from the rigors of the north, giving here a climate which is unrivaled for the general mildness of its temperature and the brightness of its sky. In immediate connection with the branch of the Alps called the Maritime Alps is the chain of the Apennines, which, first proceeding east till the Adriatic is approached, then turn south, and run down the middle of the peninsula through its whole length to the Straits of Messina; while numerous branches are thrown off laterally, and form an endless succession either of loftier hills clothed with forests, or gentler slopes covered with olives and vines. In the spaces between the mountains and hills lie valleys remarkable either for their wild romantic beauties or the fertility of their soil. In the north, enclosed between the ranges of the Alps and Apennines, is a plain of vast extent, stretching from the western frontiers of Piedmont, across Lombardy, to the shores of the Adriatic, and perhaps the most fertile in Europe. other plains, still more attractive by their beauty, occur in various parts of the Italian peninsula.

Hydrography.—The Po is the only river of magnitude. It has the advantage of pursuing its course between the Alps and the Apennines, and deriving its supplies from both of them, conveyed from the Alps by the Dora Riparia, Dora Baltea, Sesia, Ticino, Adda, Oglio, and other tributaries on the left bank of the river, and by the Stura on its right bank; and from the Apennines by the Trebbia, Secchia, Panaro, etc., all on its right bank. Another river of some importance, which has its mouth at no great distance from the former, and is partly fed in the same way, is the Adige (*Etsch* in Austria); and the Bacchiglione, Brenta, Piave,

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Livenza, and Tagliamento, which are of much less importance, have their basins in Venetia or the northeastern part of Italy, and all fall, like the Po and the Adige, into the Gulf of Venice. In the southern part of Italy, the peninsula of which it consists is not only narrow in itself, but is divided by the central chain of the Apennines into two watersheds, each of which lies so near the shore as to leave no room for the formation of large rivers. If the streams descend directly from the mountains to the shore, their course is necessarily so short as to give the character of mere torrents, often rising suddenly in their beds, and again as suddenly retiring within them. It sometimes happens, however, that the mountains, in ramifying, form parallel ridges, and thus give rise to longitudinal valleys, by pursuing which the course of the rivers is greatly lengthened, and their volume of course augmented. In this way the Italian peninsula, notwithstanding its narrowness, has obtained the Arno, Tiber, Garigliano, and Volturno. Numerous lakes are scattered over the surface. Many of them, independent of their natural beauties, derive much adventitious interest from classical associations; the most important are Lakes Maggiore, Como, and Garda.

Geology and Soils.—The general fertility of Italy is intimately connected with its geological structure. Except in the ranges of the Alps in the north, and the terminating branches of the Apennines in the south, granite and the metamorphic strata, which generally form soils of little natural fertility, are not of frequent occurrence, and occupy a very limited extent of surface. On the other hand, volcanic rocks, as might be expected in a country whose volcanic agency is still active, occupy considerable tracts, particularly on the west coasts of Naples and of the Roman territory, where, by their decomposing lavas, soils of almost exhaustless fertility have been formed. The sedimentary rocks of the Italian continent, with exception of the metamorphic strata already referred to, are comparatively recent. At the bottom of the series is the Jura limestone, which is largely developed in the Apennines. The main body of it, commencing on the eastern frontiers of Tuscany, is continued in a broad zone far south into the old kingdom of Naples, where, after a partial interruption, it reappears in the southwest, chiefly in the province of Salerno, and partly in that of Potenza, and in the southeast in the province of Bari. It also occupies a considerable space on the north side of the Gulf of Gaeta, and on the western slope of Mount Gargano. It is likewise the prevailing rock in the north of Lombardy, where it stretches east from the shore of Lake Maggiore to the Austrian province of Illyria. Above the Jurassic limestone, and occupying almost an equal extent of surface, is the chalk, with its accompanying rocks. The main body of it stretches east along the Gulf of Genoa, and north into Emilia, then turns southward through Tuscany, forms a long narrow belt along the eastern side of the main body of the Jurassic limestone, and, though partially interrupted, finally reaches the extremity of the peninsula, where, in Cape St. Maria di Leuca, its white cliffs form the eastern entrance of the Gulf of Taranto. In the north of Naples a large tract, of a somewhat oval form, lies completely enclosed by the Jura limestone. The next strata in the ascending series

belong to the Tertiary period, and consist of sandstones, travertin, and marl. These rocks occupy a considerable portion of Tuscany, and of the central part of Piedmont between Turin and Alessandria, but receive their chief development on the east coast, where, without attaining much width, they stretch without interruption from the neighborhood of Rimini to the northwest extremity of the spur. Here the main body, spreading out, is continued south-southeast, and forms the greater part of the shore of the Gulf of Taranto. Another branch, still skirting the east coast, reaches its extremity in the Gulf of Taranto. Above all the ancient strata now mentioned are immense diluvial and alluvial deposits, still in course of gradual augmentation. Of these partial tracts are found both on the coast of Tuscany and the maritime provinces on the west near Rome, particularly the Pontine Marshes; but they are insignificant in comparison with the space which they occupy in the luxuriant plains of Lombardy, not only forming extensive flats along the northern shores of the Adriatic from the Gulf of Trieste to the Gulf of Venice, but filling the greater part of the basin of the Po.

Mineral Resources.—The chief minerals are sulphur, zinc, lead, copper, coal, iron, antimony, gold, mercury, manganese, silver, arsenic, salt, graphite, borax, petroleum and asphalt. The chief sulphur mines are in Sicily; Elba is noted for the quality of its iron ore, and Lombardy and Sardinia for their zinc ore. In 1901 there were over 1,100 productive mines of various minerals, employing 68,000 workers, with a total output valued at nearly \$17,000,000.

Climate.—The peninsula in its southern part has the dry and burning climate of Africa, as well as the sirocco, which blows on its coasts, and resembles the simoom of that continent. In the continental part of the country the neighborhood of the Alps, the abundance of water-courses, and the direction of the fine valley which opens on the Adriatic are all circumstances which serve to maintain a delightful temperature. Yet this region is at times extremely cold. The climate of Italy generally is salubrious, but there are numerous exceptions to this character. In the north the lagoons and the rice-plantations of the basin of the Po give rise to exhalations which engender fevers. In central Italy the Maremma of Tuscany, the Campagna of Rome, the Pontine Marshes, and the environs of Volturno, produce miasma which infect the air especially during the night.

Forestry.—The sweet chestnut constitutes the larger part of the forests that cover the lower slopes of the Alps and the Apennines, while pine, fir, poplar, myrtle, and other evergreens, clothe the hills of a considerable portion of rest of the country. There is a governmental department of forestry directed by the ministry of agriculture, industry and commerce, through a forestry council. Exclusive of chestnut plantations, the forest area is over 10,000,000 acres producing lumber, firewood, charcoal, and secondary produce to the annual value of over \$17,600,000.

Flora.—The natural productions of the soil of Italy are as various as its climate. In the Alpine regions all the plants belonging to cold climates flourish, while the southern regions possess a real tropical flora. The olive, mulberry, fig, orange, citron, pomegranate, pistachio, jujube, and date grow in the south and in suit-

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able places in the north. In the extreme south the cotton-plant, sugarcane, Indian fig, agave, and other tropical plants are cultivated. Everywhere is seen the grapevine. The other vegetable products are common to Italy and the rest of Europe.

Fauna.—The fauna of Italy differs little from that of the other countries of Europe situated in the same latitude. Its mountains afford a retreat to the lynx, chamois, brown bear, and wolf, while among those of Sardinia is found the mouflon or wild sheep. The porcupine is very generally found in the Apennines. The pale-red fox (different from the common species) and the blind mole are also found. The birds, which are very numerous, comprise most of the species of Central Europe, a large number of those belonging to the eastern part of Europe, and some African birds, especially the Egyptian vulture. Among the reptiles are the common viper and the asp; other noxious creatures are the scorpion and the tarantula. The marine fauna of Italy is also very comprehensive, including all the varieties of fish which are found in the Mediterranean. The fisheries embrace anchovies, sardines, tunnies, sword-fish, etc. The coral polyp (among other species the madrepore) is also of economic importance, there being a large number of persons employed in the coral fishery.

Land Tenure.—There are three systems of land tenure; that of peasant proprietorship which exists throughout Italy, but chiefly in Piedmont and Liguria; the rent system common in Lombardy and Venetia; and the partnership system, general in Tuscany, the Marches and Umbria, slightly in Sardinia, Calabria, and Apulia, but abandoned in Barese and the province of Naples. The latter system consists in a form of partnership between the proprietor and the cultivator, profits and losses being equally divided, and the families of the partners subsisting in many cases entirely on the common produce of the cultivation.

Agriculture forms the chief support of the population, and the land is very productive in almost all parts of the kingdom, although it is not everywhere equally well cultivated. The best cultivation, aided by an excellent system of irrigation, is found in Lombardy, Venetia, Piedmont, Tuscany, and the parts of Emilia adjoining the Po. The most neglected parts of the country in point of cultivation are the islands of Sicily and Sardinia. About 85 per cent of the surface of Italy is productive, and 15 per cent unproductive. Of the productive land again about 41 per cent consists of arable land and vineyards, 21 per cent of meadows and pastures, 5 per cent of olive and chestnut plantations, and 18 per cent of forests. Italy may be divided into four agricultural zones or regions:—(1) the olive, orange, and citron region, embracing Sicily and Sardinia, the Neapolitan provinces except the Abruzzi, and the part of the coast of Liguria called Riviera di Ponente; (2) the region of olives and pines, embracing the Abruzzi, Umbria, Tuscany, and the part of the Ligurian coast called Riviera di Levante; (3) the vine and oak region, embracing Lombardy, Venetia except the province of Udine, the provinces of Parma, Piacenza, Modena, Novara, Alessandria, and Lomellina, now part of the province of Pavia; (4) the vine and chestnut region, comprising the two large Piedmontese provinces of Turin and Cuneo, and

the province of Udine in Venetia. All kinds of cereals are cultivated. The wheat is of fine quality, and is chiefly used as a breadstuff by the wealthier classes, while maize and rye are principally used by the poor, who also consume great quantities of pulse and chestnuts. Among plants used in commerce and manufacture the following are grown: hemp and madder, which are articles of export, flax, tobacco, hops, and rape in small quantities, saffron, cotton (in the level districts of the province of Salerno, and of Calabria, Sicily, and Sardinia), and sugarcane in Sicily and Sardinia. The commoner kinds of fruit-trees are the objects of attention everywhere, and the cultivation of southern fruits is carried on particularly in the Neapolitan and Sicilian provinces, and in Sardinia, and furnishes large quantities for export. Chestnuts are frequently used as a substitute for bread. In the cultivation of the olive Italy surpasses all other European states; so that, although the home consumption of olive-oil is very large, there remains a considerable quantity for exportation. There is also a very large production of wine. The average annual production of some of the above-mentioned objects of cultivation may be estimated as follows:

Wheat	143,400,000	bushels.
Maize	85,600,000	"
Oats	19,360,000	"
Rye and barley	18,400,000	"
Rice	26,800,000	"
Other cereals	18,000,000	"
 Total cereals	311,560,000	"
Potatoes	19,360,000	bushels.
Hemp	111,000,000	lbs.
Flax	30,000,000	"
Cotton	22,000,000	"
Tobacco	7,250,000	"
Olive-oil	74,500,000	gals.
Wine	666,000,000	"

Italy anciently was celebrated for its wines, the best of which were obtained from the vineyards on the two slopes of the Apennines. Among the most celebrated were those of Liguria, Albanum (now Albano), near Rome, which received the warmest praises from ancient writers; those of Nomentum (Mentana), about 15 miles to the east of Rome, which are compared by Strabo to the best wines of Greece; those of Setia (Sezze), about 35 miles to the southeast of Rome, which were much prized by Augustus and all the wealthy Romans of his age; the Cæcuban wine, which grew in Campania, the province to the south of Latium, and which from the earliest times held the first place among the wines of Italy, and was particularly esteemed for the exquisite delicacy of its flavor; the Falernian and Massic wines, which also grew in Campania, and likewise had a high reputation; and the Mamertine wine from the neighborhood of Messana in Sicily. The southwest of Sicily, which now produces excellent wines, is nowhere mentioned for its wine-growing qualities in the writings of the ancients. At the present day the wines of Italy are admittedly inferior to their ancient reputation. The vines yield many wines, among which the liqueur wines are distinguished for their good quality; but those which serve for daily use cannot enter into competition with those of France. The most of them are at once sweet and harsh, often coarse, and although they appear to combine much body and strength they do not easily bear transport, and deteriorate in little time, even

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without being removed to a distance. Their bad quality proceeds not only from the want of care shown in the cultivation of the vines, but also from the bad processes employed in the manufacture. Among the liqueur wines which are so abundant in Italy may be mentioned the lacryma-Christi, nasco, giro, tinto, Malmsey, aleatico, and muscat. The most famous of the Italian red wines are those of Carmignano in Tuscany, and those of the Isle of Elba, Bari, and Ischia. The white wines of Marsala and Castel-Veterano are compared to Madeiras of the second class.

Stock-raising.—The rearing of live-stock is an important industry in Italy, which exports cattle, sheep, goats, and swine. Horses are imported, and also sheep's wool. The cultivation of green crops as food for cattle is scarcely known. During the summer the animals are led to the pastures, and in winter they are furnished with straw and a little hay in their stalls. The farmers do not give much attention to the improvement of their domestic animals, which have lost much of their original excellence. The cattle are estimated to number about 5,000,000 (including 15,000 buffaloes), many of them team oxen. Sheep number 6,900,000. Some camels are perfectly acclimated near Pisa in the low-lying tracts of San Rossore. The cheese of Italy is famous, especially the Parmesan.

Commerce.—The foreign trade of Italy is not large in proportion to the size and population of the country, and does not make much progress. In 1882, 1889 and 1900 the imports and exports reached the following figures:

	1882	1889	1900
Imports.....	\$269,080,000	\$277,230,000	\$341,295,925
Exports.....	231,160,000	190,130,000	270,979,920

Among the chief imports are coal, grain, cotton, silk, wool, sugar, coffee; by far the largest export is silk, raw and thrown, others being wine, olive-oil, oranges and lemons, hemp and flax, sulphur. In 1901 the import of coal reached the value of \$30,001,763; of raw cotton, \$31,618,501; cotton goods, \$1,918,296; of silk, raw, twisted, etc., \$14,766,680; of machinery, \$14,521,488. In the same year the exports of silk and silk goods were valued at \$86,272,986 (as against \$101,764,494 in 1899); of animals and animal products at \$10,504,021; of wine in casks at \$7,405,762; olive-oil, \$9,130,994; fruit, \$10,710,753. The trade of Italy is chiefly with France, the United Kingdom, the United States, Germany, Austria, Switzerland, and Russia, the United Kingdom sending in 21 per cent of the imports, and the United States being second with 13 per cent.

In the foreign trade of the United States, Italy occupies the eighth place in exports, and the tenth place in imports, the largest items of import being raw silk, sulphur, and lemons.

Manufactures.—Since the consolidation of the Italian kingdom the manufactures of the country have made considerable advances, especially in the department of Tuscany and the northern provinces. They now afford support to 13 per cent of the whole population. Machine-making, although not sufficing to meet the internal wants of the country, nevertheless employs many workmen, especially in Genoa and neighborhood, Turin, Milan, and Naples. Coach and carriage making is an important industry in Milan. Ship-building is largely carried on in

Liguria. Musical instruments are made in all the capitals. Especially famous are the bow instruments of Cremona, and nowhere are violin strings made so well as in the Abruzzi. In the iron industry the department of Lombardy stands at the head; and in that department more particularly the provinces of Brescia, Como, and Milan. The town of Brescia is the chief seat of the cutlery manufactures. The manufacture of gold and silver wares is very flourishing in Rome, Milan, Naples, Genoa, Venice, and Catania, and like that of articles in bronze has long been an important branch of Italian manufacturing industry. Italy is very rich in marble of the most beautiful and various colors and markings. The department most celebrated in this respect is Tuscany, especially the province of Massa e Carrara, and the district of Serravezza in the province of Lucca. The district of Volterra in the province of Pisa is noted for its alabaster quarries and the making of articles in alabaster. The cities of Rome, Naples, and Florence enjoy a world-wide reputation for their cameos and mosaics, as also (along with Leghorn and Genoa) for articles of coral. Earthenware manufactures have long been carried on in Italy with the best success. The articles in terra-cotta especially are remarkable for the beauty of their forms. Venice and the neighboring island of Murano are celebrated for the manufacture of glass beads, but the other glass manufactures of Italy do not nearly suffice for the home consumption. In the department of chemical industries the production of boracic acid (obtained from the lagoons of Tuscany) and of tartaric and citric acids, the manufacture of soap (of great consequence in Venice), and the preparation of alizarine or madder-red at the mouth of the Sarno, may be particularly mentioned. Among articles used for meat or drink, pickled meat and sausages (which are exported to a considerable extent), and liqueurs and rosolios, are the most important which are made in Italy. The sugar industry holds a very subordinate place, as does also the brewing of beer. The manufacture of tobacco is a state monopoly, and employs about 15,000 hands. The spinning and weaving industries in Italy are in some branches very highly developed. The most important of these are the silk manufactures, which form one of the chief sources of the national wealth. With the exception of Abruzzi, Basilicata, and the island of Sardinia, all the provinces of the kingdom take part in the preparation of the raw silk which is used in the manufacture, but this is more especially the case in Lombardy, Piedmont, and Venetia. The rearing of silkworms is more largely carried on in Italy than in any other country in Europe. Over 2,000,000 spindles are employed in spinning the silk, and the weaving is a very extensive branch of manufacture in Como, Genoa, Caserta, Milan, Turin, Florence, and Naples. Silk industries employ over 170,000 hands. The cotton manufacture is, as a textile industry, next to that of silk, and has greatly increased in recent years, the factories being chiefly in Lombardy, Piedmont, Lucca, and the Genoese district. About 1,900,000 spindles are now employed, the number of hands being 80,000. Woolen manufactures are carried on chiefly in Upper Italy, in Piedmont and Venetia, in the provinces of Novara, Vicenza, and Turin. The number of spindles at work is about 345,000, the

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looms about 9,000 (half being power-looms), the hands employed about 28,000. The import of woolen yarns, and still more so of woolen fabrics, is large. Flax, hemp, and jute support industries of some importance. Hand-spinning is general where the raw material is grown. Good fabrics are woven, although they are not able to compete with those made in England, France, Germany, and Austria. Hempen fabrics, which are chiefly produced in the provinces of Bologna and Ferrara, where rope-making also plays an important part, are articles of export. Tanning is carried on in almost every part of the peninsula. There are in several places, but chiefly Genoa and Naples, factories for the making of gloves, boots, and shoes, which are of excellent quality, and exported to various countries, and even to America. The paper manufacture is very flourishing, and great advances have been made in the processes employed. In the making of straw hats and other articles in plaited straw, Italy maintains the first place among the countries of Europe. The chief seat of this industry is in Tuscany (especially Florence and its environs), where it supports a great number of persons. The products of this manufacture are known all over the world. The making of furniture, and of articles of turnery, and articles used for personal adornment, as well as the manufacture of felt and silk hats, may be mentioned among the other manufacturing industries carried on in Italy.

Shipping and Navigation.—In 1901 the merchant marine of Italy consisted of 5,511 sailing and 446 steam vessels, of 945,008 tons burthen, the steamers being of 376,844 tons burthen, these figures including vessels engaged in the coasting trade and in fishing from 1 ton burthen upward. The total tonnage entered at Italian ports in 1901 amounted to 31,362,192 tons; cleared, 31,317,937 tons. The principal ports are Genoa, Leghorn, Messina, Naples, Palermo, Venice, and Catania, Genoa standing first and Naples second.

Railways, Telegraphs, and Post-office.—The length of the railways in operation, including Sicily and Sardinia, is now about 10,000 miles, of which considerably more than half belong to the state. The first line of railway was opened in 1839, but the process of construction was for a long time slow. In recent years the state has engaged in constructing railways, and has also obtained possession of others by purchase, but all are now worked by private companies. It is expected that when all the lines undertaken by the government have been completed, the total cost of construction will have amounted to 5,000,000,000 lire, or \$1,000,000,000. The expenditure in 1900 amounted to \$47,903,278, and the receipts to \$63,673,265, of which \$24,698,193 were from 60,029,673 passengers.

The total length of the telegraph lines in operation in the kingdom in 1900 was 27,918 miles, most of which belong to the state. The total number of inland despatches amounts to between eight and nine millions annually. The post-office in the course of the year now transmits considerably more than 373,000,000 letters and post-cards. The number of post-offices in the kingdom, including collecting boxes, is stated to be over 8,000.

Money, Weights, and Measures.—The monetary system of Italy is based on the Decimal System, the lira, equivalent to the French franc,

being divided into 100 centesimi. The lira is equal to about 20 cents. The weights and measures also, are those of the metric system, the French names having such modifications as are necessary to give them an Italian form. Thus the Italian gramma—the grammme, the chilogramma—the kilogramme, the litro—the litre, the ettolitro—the hectolitre, and so on; the metro—the mètre, the etometro—the hectomètre, the chilometro—the kilomètre, etc.; the aro—the are, the ettaro—the hectare; and the stero—the stère, and the decastero—the decastère. The quintale metrico is the same as the quintal metrique, and the tonnella the same as the tonneau metrique. See DECIMAL SYSTEM.

Banking.—There is no national bank in Italy and since 1893 only three banks of issue. The chief of these is the Bank of Italy, formed by the union of the National Bank of the Kingdom of Italy, founded in 1850, with a share capital of \$40,000,000, and having its chief seats in Florence, Genoa, Milan, Naples, Palermo, Rome, Turin, and Venice; with the National Bank of Tuscany, founded in 1857, share capital \$10,000,000; and the Tuscan Credit Bank, founded in 1860, share capital \$12,000,000. The other two banks of issue are the Bank of Naples, founded in the 16th century; and the Bank of Sicily, founded in 1843; chief seats, Palermo and Messina.

Constitution and Government.—The constitution of the kingdom of Italy is a limited monarchy. It is based upon the fundamental statute of 4 March 1848, fixing that of the kingdom of Sardinia. The throne is hereditary in the male line of the royal house of Savoy. The king attains his majority on completing his 18th year. He exercises the power of legislation only in conjunction with a national parliament, consisting of two chambers. The first chamber is called the senate, and is composed of the princes of the blood, and an indefinite number of members appointed for life by the king. These last must be above 40 years of age, and must be distinguished either by holding or having held some high office either in church or state, or by eminent services in literature, science, art, or any other pursuit tending to the benefit of the nation, or they must have paid for at least three years a sum not less than 3,000 lire (\$600) in direct taxes. In 1902 the senate numbered 356 members. The second chamber is called the chamber of deputies, and consists of 508 members, who are elected by a majority of all the citizens above 21 years of age who are in the enjoyment of civil and political rights, can read and write, and who pay direct taxes to the state or the provincial administration to the amount of 20 lire (\$4) yearly. Certain persons enjoy the franchise independently of the taxation test, such as members of learned academies and of chambers of commerce, professors, state officials, members of knightly orders, doctors, advocates, etc. For the election of the members of the chamber of deputies the whole country is divided into electoral colleges or districts. Any one who has the right of voting and has completed his 30th year may be elected, unless he be a clergyman or an officer of state. Some officers of state, however, may be elected. The king calls the chambers together every year. The sittings are public. The president of the senate is appointed by the king, that of the chamber of deputies is elected by the chamber itself.

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The chamber of deputies has the right of impeaching ministers of the crown, in which case the senate is the court before which the impeachment is tried.

The executive power of the state is exercised by the king through responsible ministers forming a council of ministers. In addition to this there is a state council possessing consultative powers, and authorized to decide on questions of competence arising between the administrative departments and the law-courts, as well as in cases of dispute between the state and its creditors. There are 11 departments in the government: 1, the ministry of foreign affairs, to which is attached the diplomatic council; 2, the ministry of the interior, with the supreme sanitary council, and the command of the national guard; 3, the ministry of justice and ecclesiastical affairs; 4, the ministry of finance, with the permanent council of finance; 5, the ministry of the treasury; 6, the ministry of war; 7, the ministry of marine, with the supreme council for naval affairs; 8, the ministry of public instruction, with the supreme council of instruction; 9, the ministry of public works, with the supreme council for public works; 10, the ministry of agriculture, manufactures, and commerce, with the councils for trade and manufactures, agriculture, mines, and woods and forests; and 11, the ministry of posts and telegraphs.

Finances.—The finances of Italy are not in a satisfactory condition, this being due partly to the expensive wars which were necessary in order to establish and consolidate the unity of the kingdom, partly to the increase of the public debt in consequence of the successive annexations of different portions of the Italian territory, since the present kingdom of Italy has naturally inherited the debt of each of the separate states of which it was formed partly to the large sums expended on railways and on the army and navy. At the end of 1874 the nominal capital of the whole Italian debt was valued at a sum equal to \$1,976,717,845. In 1901 the total debt was \$2,528,698,992. The difficulty experienced by the government in raising money to meet all its obligations has impelled it to resort to means which are, in some cases, extremely oppressive and unpopular (such as the grist tax), and in other cases scarcely creditable (state lotteries). The Italian budget divides the revenue and expenditure into ordinary and extraordinary. According to the budget of 1902-3 the total revenue estimated for that year was \$305,133,700, and the total expenditure \$362,472,708. For a number of years following the establishment of the kingdom (1861) the expenditure generally exceeded the revenue, the deficit rising in one year (1866) to \$123,400,000. From that date the deficit decreased steadily, and 1884-5 showed a surplus of \$12,000,000. Such a surplus, however, is rare, that for 1899-1900 being \$1,042,097. The progressive increase of the receipts to balance the expenditure is mainly due to two causes, the establishment of new taxes and the more careful collection of the old ones. Besides the general budget there is one for communes and another for provinces, both of which exhibit, if not an altogether satisfactory condition, at least an improving one.

Army and Navy.—By the law of 7 June 1875, supplemented by subsequent enactments, all men capable of bearing arms are under obligation of military service from the end of their

20th to the end of their 39th year. The forces are divided into three main branches: the standing army, the mobile militia, and the territorial militia. The regular time of service for the infantry is two or three years with the flag, six or five years in the reserve, three or four years in the mobile militia, and seven years in the territorial militia. The cavalry serve three years with the flag, six years in the reserve, and ten in the territorial militia. A certain number of the annual recruits (decided by the ballot) are only called on to serve under the flag from two to six months, which may be spread over several years. A third category have to engage in military exercises for only 30 days during the 19 years. The whole kingdom is formed into 12 military districts, each with an army corps. In 1901 the permanent standing army numbered in all 819,069, of whom 261,970 were actually serving with the flag. Of the latter 120,975 were infantry, 20,980 cavalry, and 32,563 artillery. The mobile militia numbered 320,170, the territorial militia 2,275,631. The total army strength was 3,356,920.

Great efforts have been made to strengthen the fleet in recent years, and it now possesses some powerful vessels. There are 14 battleships of the first class, two of which, the *Duilio* and *Dandolo*, have their citadel armor 22 inches in thickness. These are reputed to be among the most powerful war-ships yet constructed, each carrying four 100-ton Armstrong guns. Three others carry 105-ton guns. There are also 11 first-class cruisers, all decks protected. The total strength of the navy is 25,595 men, including 1,799 officers, of which the chief are one admiral, 21 vice- and rear-admirals and 203 captains.

Colonies.—Italy possesses the colony of Eritrea on the African shore of the Red Sea, and some territory in Somaliland. The total area of these possessions is about 188,000 square miles, with a population of about 850,000.

Ethnology.—The inhabitants of Italy are a mixture of many different races who have successively obtained the mastery of the country. Central Italy was the seat of several races which had partly been settled in the land from time immemorial, and were thence regarded as aborigines, and had partly immigrated from foreign countries. Among the former were the Sabellians, a powerful, warlike, freedom-loving people, subdivided into various tribes, the chief of whom were the Sabines, Samnites, and Æquians; the Umbrians, who dwelt to the north of the Sabellians, and are considered to be the most ancient of all the races inhabiting Italy; the Latin tribes, living to the west of the Samnites in the region called, from them, Latium; and the Oscans, Opicans, or Ausonians, living farther south than the Latins, being the earliest inhabitants of Campania. Among the latter races who came into Italy from foreign countries, the most remarkable were the Etruscans, who dwelt between the Gauls in the north, the Umbrians, the Latins, and the sea. The region on both sides of the Po (Padus) in Upper Italy was inhabited by a Gallic race, divided into numerous tribes and states possessing a number of towns on the coast as well as on the fruitful plain in the interior. Adjoining them on the northeast were the Venetians, and on the west coast the Ligurians. Lower Italy was occupied by Apulians in the southeast, supposed

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to be a member of the Oscan race; and by Lucanians, a Sabellian tribe; and the Brutii in the southwest, the former occupying the district to the south of Campania and Samnium, and extending as far as the root of the small peninsula in the extreme southwest, which was the habitation of the latter. The coasts of lower Italy as far north as Latium were studded many hundred years before Christ with Greek colonies, from whom the neighboring tribes derived some of the elements of Greek culture and an acquaintance with Greek mythology. Evidence of this is found in the Latin legend to the effect that after the destruction of Troy the hero Æneas, with a number of Trojan followers, came to Italy and formed a settlement in Latium, where he married the daughter of the Latin king.

The Gallic (Celtic) and the Roman elements have in the course of time become the principal ingredients of Italian nationality, but few traces of the character of the aboriginal population being now discernible. In upper Italy the Germanic element has contributed its share toward the formation of Italian nationality. Even the name of Lombardy is derived from that of a German tribe. In southern Italy and Sicily the Arab element enters into the mixture of national characteristics. The Italian has generally a fine exterior. He is slim rather than stout, but strong and agile. A dark complexion, an expressive countenance, sparkling eyes, black hair, and a grave gait combine to render the physique of the Italian characteristic and prepossessing. A great proportion of the inhabitants retain many of the characteristics of the Roman conquerors of the world. The predominating system of agriculture, however (see *Land Tenure*), the peasants being obliged to pay one half of their gross income to the landlords, and the minute subdivision of the soil, exert a depressing effect upon the condition of the lower classes.

Population.—The total population of Italy as shown in the table under *Political Divisions* was 32,475,253, or 293 people per square mile, as compared with 28,459,628 in 1881, thus showing an increase of about 14 per cent in 20 years. The foreign population in 1901 consisted of 37,706 residents and 23,709 transients, the majority being Austrians, Swiss, Germans, English and French. The natives of foreign extraction comprise 90,000 Albanians in southern Italy, 80,200 French in northern Italy, 31,200 Greeks in Calabria, 30,000 Slavs and 11,400 Germans in the northeast, and 9,800 Spanish in Sardinia.

Religion.—According to the provisions of the fundamental statute the Roman Catholic is the state religion, but all other creeds are tolerated, and adherents of all religions have equal municipal and political rights. The spiritual head of the Roman Catholic Church, the Pope, has his seat at Rome. His prerogatives are regulated by the law of 13 May 1871, which also determines the relation between church and state. By this law the person of the Pope is pronounced sacred and inviolable. The Italian government pays sovereign honors to the Pope, and guarantees him a yearly dotation of 3,225,000 lire (\$645,000). The Pope also enjoys the possession of the palaces of the Vatican and the Lateran, and the villa of Castel Gandolfo, without being subject to taxes on their account, and these places are not put under the jurisdiction of the state. Temporary residences of the Pope,

as well as places where a conclave or a council is held, are protected by similar immunities. The Pope is perfectly free in the exercise of his spiritual functions; and free intercourse is also guaranteed between the head of the church and the episcopate, as well as the whole Catholic world. The ambassadors of the Pope, and those accredited to the Holy See by foreign powers, enjoy all the privileges granted to such functionaries by international usage. The Church has the entire right of nominating to all ecclesiastical offices and benefices. The royal *exequatur* and *placet* are abolished. This *guaranty-law*, as it is called, which really determines the relations between church and state, at the present day, has never been acknowledged by the Popes, who have hitherto declined to accept the dotation. In the kingdom of Italy there are 51 archbishoprics and 223 bishoprics, beside 6 cardinal-bishops with sees in Italy. The number of parish priests is about 76,500. The monasteries and convents have been abolished by a royal decree dated 7 July 1866, and extended to the former Papal States, and to Rome itself, by another decree dated 25 June 1873. Among the Waldenses, who follow the religious observances of the Reformed Church, the highest spiritual authority is confided to a synod.

Judiciary.—For the administration of the law there are, beside numerous courts of first instance, 161 civil tribunals and the tribunals of correction, 92 assize courts, 24 courts of appeal, and 4 courts of cassation (at Turin, Florence, Naples, and Rome). The court of accounts occupies an independent position.

Local Government.—The constitution of the provinces and communes is based upon the law of 20 March 1865. Each province has the right of independent administration, and the executive power is entrusted to a provincial council, the members of which are elected by the communal electors for five years, and to a provincial deputation or commission elected by the council from its own members, and managing the business of the province when the council is not sitting. The provincial councils elect their own presidents and other officials. In each commune there is a communal council elected like that of the provinces for five years, and a municipal giunta elected by the council. The head of the communal administration is the sindaco, who in all the chief communes is elected by the council from among its own members, and in other cases is nominated by the king from the members of the communal council.

Education.—Compulsory education is enforced by the law of 15 July 1877, for all children who have completed their sixth year, and do not receive adequate instruction either at their homes or in private schools. Attendance is obligatory at the rudimentary schools in the commune for such children up to their ninth year, and in case of failure to pass the requisite examination they may be detained a year longer. The elementary communal schools are entirely supported by the municipalities, which nominate and pay the teachers, and carry out the educational laws under the supervision of the state school-inspectors. The subjects of compulsory instruction are reading, writing, arithmetic, the metric system, the rudiments of Latin, and the first duties of a man and a citizen. Religious instruction is not obligatory. There are many schools supported by the Church, as well as

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private schools, but all must adopt the government code, and are open to government inspection, while all teachers must hold the government certificate. The urgency of the need for all practicable measures being used to advance the cause of popular education in Italy may be gathered from a return issued by the Italian government in March 1870, which gives information regarding the amount of education received by the military conscripts born in 1847, and called up for active service in 1868, and shows that throughout the kingdom of Italy the average percentage, reckoned over the different provinces of the kingdom, of these conscripts who were totally unable to read or write was 64.27. In the province of Girgenti it was 85.82, and in the southern provinces generally it was above 80. The average percentage by 1897 had decreased to little more than 37. It is now comparatively rare to meet a boy or girl who cannot at least read. Education is practically free up to the university. Beside the regular day schools there are evening schools, in which elementary education may be carried further. The principal institutions for secondary education are the gymnasiums and lyceums, the former having a course of five years, the branches taught being Greek, Latin, Italian, history, geography, and arithmetic; the latter, having a course of three years, add to these subjects philosophy, mathematics, physics, chemistry, and natural history. No fees are charged either in gymnasium or lyceum. In addition to these there are a number of technical schools, in which fees are charged. There are also schools of agriculture, mining, commercial education, etc. For the higher education there are no less than 21 universities, many of them of ancient foundation, and at one time of considerable renown. The oldest are those of Bologna (founded in 1119), Padua (1222), Naples (1224), Rome (1244), Perugia (1320), Pisa (1329), Siena (1349), Pavia (1390), Turin (1412), and Parma (1422). The other universities are Cagliari, Camerino, Catania, Ferrara, Genoa, Macerata, Messina, Modena, Palermo, Sassari, and Urbino. The number of students at all the universities was returned in 1897-8 at 22,540, of whom Naples had 5,465, Turin 2,551, and Rome 2,300. In all universities the theological faculty has been abolished. Cooperating with these institutions for the education of the people there are about 150 training schools for teachers, with an attendance of about 18,000 students. There are government art schools at Bologna, Carrara, Florence, Lucca, Milan, Modena, Parma, Ravenna, Rome, Turin, Venice, etc., with a total of 3,300 pupils; and in addition the academies of Genoa, Bergamo, Verona, Siena, Pisa, and Perugia. Musical conservatories are supported by the government at Florence, Milan, Naples, Palermo, and Parma.

Emigration.—Military conscription, oppressive taxation, and the agricultural conditions already enumerated, are the causes of extensive emigration, the great bulk of which finds its way to the United States, Argentina, and Brazil, European nations adjacent to Italy also receiving their share. From 1870 to 1902 the total number of Italians who arrived in the United States amounted to 1,391,076. If to this is added the children born here, a total of 1,500,000 is reached. It is estimated that for 10 years Italian immigration will continue in the present proportion and

then gradually decrease, so that in 1920 the Italian population of this country will probably number from four to five millions.

The Italian immigration has a peculiar character. Until 1890 the percentage of women was less than 15, but now it has increased to 39. This indicates that the immigration has a marked tendency to become permanent. Thirty per cent or more of Italian adults who had been in this country more than 10 years went back at least once to Italy, and 80 per cent of these came to this country again, bringing their families with them. During the time in which the family is not here the man sends money weekly to Italy. It is calculated that about \$50,000,000 crosses the ocean every year in this way.

The Italian population in this country is changeable; roughly speaking, it is better the farther we go westward. New York has about 250,000 Italians, who are chiefly the worst kind of those coming to America. Philadelphia has about 80,000; Newark, N. J., 40,000; Boston, 25,000. In the New England States, where about 50 per cent of the entire population are foreigners, the Italian element is no more than 10 per cent, but is rapidly increasing. Cincinnati, Ohio, has only 5,000 Italians; Pittsburg, 12,000; Chicago, 15,000. California has about 60,000 Italians, of whom 25,000 are in San Francisco. The Italians in California are of the best kind, mostly Genoese, clean and intelligent.

Unfortunately many Italians coming from their farms abroad, who could be a valuable and strong agricultural element in this country, mass in the unclean and narrow quarters of the big cities. The only difficulty in directing them to the farming West, where they would be easily Americanized, is their ignorance of the state of things in this country and the lack of money to make the journey.

History.—Italy did not become the general name of this country until the age of Augustus. It was known to the Greeks under the name of Hesperia, and also, either in whole or in part, by those of Ausonia, Saturnia, and Enotria. The name of Italia was at first merely a partial name for the southern extremity. From the earliest times Italy was inhabited by many tribes of different origin. See paragraph on *Ethnology*. At an early period Rome, the chief town of Latium (founded, according to the received date, 753 B.C.), became predominant among the cities and tribes of Central Italy, and it gradually extended its influence over the whole country until, by the end of the 3d century B.C., it had brought into allegiance or subjection all the tribes of Italy from north to south, including those of the islands of Sicily, Corsica, and Sardinia. The history of ancient Italy thus merges to a great extent in that of Rome, to which article, as well as those treating of the more important races of Italy, the reader is referred for further information concerning ancient Italy, while the subsequent history of Italy is resumed from the overthrow of the empire in the west, 476 A.D.

From 476 to 568 Italy was under the dominion of the Herulians and Rugians, and of the Ostrogoths. Odoacer, the leader of the Roman-Germanic troops, dethroned the Emperor Romulus Augustus, assuming the title of King of Italy, and after ruling 12 years was defeated by Theodoric, king of the Ostrogoths, who

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ruled over Italy with Ravenna as his capital. Theodoric, who combined the vigor of the north with the cultivation of the south, is justly termed the Great, and, under the name of Dietrich of Bern (Verona), has become one of the principal heroes of old German story. About 568 the country was invaded by the Lombards (Langobardi, Longobardi), a German people which had emigrated from the Elbe to Pannonia. Under King Alboin they conquered the Po basin, which received from them the name of Lombardy. The kingdom of the Lombards included Upper Italy, Tuscany, and Umbria. Alboin also created the Duchy of Benevento, in Lower Italy, with which he invested Zotto. The popes, in their efforts to defend the freedom of Rome against the Lombards, had recourse to the Frankish kings. In consideration of the aid expected against King Astolphus, Pope Stephen III. (754) anointed Pepin, who, with the approbation of Pope Zacharias, had been made king of the Franks in 752, and with the assent of the municipality of Rome, appointed him patrician. In 756 Pepin presented the exarchate of Ravenna, with the five cities, to the Pope. At the invitation of Pope Hadrian I. Charlemagne made war upon Desiderius, the king of the Lombards, took him prisoner in his capital, Pavia, united his empire with the Frankish monarchy (774), and eventually gave Italy a king in his son Pepin. Charlemagne was unsuccessful in his attempts against the Duchy of Benevento, the independence of which was maintained by Duke Arichis, and against the republics in Lower Italy, where Naples, Amalfi, and Gaeta in particular, had become rich by navigation and commerce. Leo III. bestowed on the king of the Franks, on Christmas day, 800 A.D., the imperial crown of the West. But dislike to the Franks united the free cities, Rome excepted, more closely to the Eastern Empire. During the lifetime of Charlemagne Frankish Italy was given to his grandson Bernard (810), who having attempted to become independent of his uncle, Louis the Debonnaire, was deprived of the crown, and had his eyes torn out. Italy now remained a constituent part of the Frankish monarchy, till the partition of Verdun (843), when it was allotted, with the imperial dignity, and what was afterward called Lorraine, to Lothaire I., eldest son of Louis. Lothaire left the government (850) to his son Louis II., the most estimable of the Italian princes of the Carlovingian line. After his death (875) Charles the Bald of France first took possession of it, and after his death (877) Carloman, who was succeeded, in 884, by his brother Charles the Fat, who united the whole Frankish monarchy for the last time. His dethronement (887) was the epoch of anarchy and civil war in Italy. Berengarius, duke of Friuli, and Guido, duke of Spoleto, disputed the crown between them. Guido was crowned king and emperor, and after his death (894) his son Lambert, although Berengarius got himself crowned king in the same year. Arnulf, the Carlovingian king of the Germans, enforced his claims to the royal and imperial crown of Italy (896), but like most of his successors was able to maintain them only during his residence in the country. After the death of Lambert (898) and Arnulf (899) the struggle for supremacy in Italy continued, the competitors now being Berengarius, of Friuli, and Louis, king of Lower

Burgundy (Arles), but at last the former succeeded in restoring quiet by driving out his rival. He reigned from 915 when he was crowned emperor till 924, when he was assassinated. Hugh of Provence, who succeeded, sought to strengthen the insecure throne of Italy by a bloody tyranny. His nephew, Berengarius, marquis of Ivrea, fled to Otho the Great of Germany, assembled an army of fugitives, returned, and overthrew Hugh (945), who was succeeded by his son Lothaire. Berengarius became his first counsellor, and after the death of Lothaire, in 950, poisoned, it was said, by Berengarius, wished to compel his widow—the beautiful Adelaide—to marry his son. Escaping from his cruelty she applied for aid to Otho I., king of Germany, who passed the Alps, conquered Pavia, became king of the Franks and Lombards (in 951), and married Adelaide. To the cession of Friuli, the key of Italy, which Otho gave to his brother Henry, Berengarius was indebted for permission to reign as the vassal of Otho. But 10 years after, on complaints, Otho returned (961), deposed him, and led him prisoner to Bamberg. Early in the following year (962) Otho was crowned emperor by Pope John XII., thus uniting Italy with Germany, and from this event dates the foundation of what is known in history as the Holy Roman Empire.

Otho granted to the Italian cities privileges that were the foundation of a free constitution. Owing to the corruption existing in the Papal Court he deposed John XII., who had crowned him emperor, and chose Leo VIII. in his stead; but the people, jealous of its right of election, chose Benedict V. From this time the popes instead of ruling the people of Rome, became dependent on them. In Lower Italy the Republics of Naples, Gaeta, and Amalfi defended their independence against the Lombard duchy of Benevento, with the more ease in that they had a common enemy in the Saracens, who previously invited over from Sicily by both parties (about 830), as auxiliaries against each other, had settled and maintained themselves in Apulia. Forty years later the Greeks in Lower Italy, who had adhered to the Byzantine Empire, succeeded, with the aid of Louis II. of Germany, in recovering the territory that had been wrested from them by the Saracens, and out of the recovered region formed a separate province, called the Thema of Lombardy, which continued under their dominion upward of a hundred years, being governed by a capitan (governor-general) at Bari. Otho the Great did not succeed in driving them from Italy, and the marriage of his son, Otho II., with the Greek princess Theophania, put an end to his exertions for this purpose.

In opposition to the designs of the Count of Tusculum, who wished to supplant the absent emperor at Rome, a noble Roman, the consul Crescentius, attempted to govern Rome under the semblance of her ancient liberty (980). Otho II., king since 973, occupied with his projects of conquest in Lower Italy, did not interfere with this administration, which became formidable to the two popes Boniface VII. (anti-pope) and John XV. But when Otho III., who had reigned in Germany since 983, raised his kinsman Gregory V., to the papedom, Crescentius caused the latter to be expelled, and John XVI., a Greek, to be elected by the people. He also endeavored to place Rome again under the nominal supremacy of the Byzantine Em-

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pire. Otho, however, reinstated Gregory, besieged Crescentius in the castle of San Angelo, took him prisoner, and caused him to be beheaded with 12 other noble Romans (998). But the Romans again threw off their allegiance to the emperor, and yielded only to force. On the death of Otho III. (1002) the Italians considered their connection with the German Empire as dissolved. Harduin, marquis of Ivrea, was elected king, and crowned at Pavia, whereupon Milan, the enemy of Pavia, declared for Henry II. (in Italy, I.) of Germany. A civil war ensued, in which every city, relying on its walls, took a greater or less part. Henry was chosen king of Italy by the nobles assembled in Pavia; but disturbances arose in which a part of the city was destroyed by fire (1004 A.D.). Not till after Harduin's death (1015) was Henry recognized as king by all Lombardy. He was succeeded by Conrad II. (in Italy, I.). When Henry III. (in Italy, II.), the son of Conrad, whom he succeeded in 1039, entered Italy (1046), he found three papal claimants in Rome, whom he deposed, appointing in their stead Clement II., and ever after filled the papal chair, by his own authority, with virtuous German ecclesiastics. Henry died in 1056. During the long minority of his son Henry IV. (in Italy, III.) the policy of the popes, directed by the monk Hildebrand (afterward Gregory VII.), succeeded in creating an opposition which soon became formidable to the secular power. (See POPES.) The Normans also contributed to this result. As early as 1016 warriors from Normandy had established themselves in Calabria and Apulia. Allies sometimes of the Lombards, sometimes of the republics, sometimes of the Greeks against each other and against the Saracens, they constantly became more powerful by petty wars. The great preparations of Leo IX. for their expulsion terminated in his defeat and capture (1053). Nicholas II. united with the Norman princes, and, in 1059, invested Robert Guiscard with all the territories conquered by him in Lower Italy. From that time the Pope, in his conflicts with the imperial power, relied on the support of his faithful vassal, the duke of Apulia and Calabria, to which Sicily was soon added. While the small states of the south were thus united into one large kingdom, that in the north was dissolving into smaller states. The Lombard cities were laying the foundation of their future importance. Venice, Genoa, and Pisa were already powerful. The Pisanese, who, in 980, had given to Otho II. efficient aid against the Greeks in Lower Italy, and in 1005 boldly attacked the Saracens there, ventured, in connection with the Genoese (no less warlike and skilled in navigation), to assail the infidels in their own territory, and twice conquered Sardinia (1017 and 1050), which they divided into several large fiefs, and distributed them among their principal citizens.

Gregory VII. humbled Henry VII. in 1077. Urban II. instigated the emperor's own sons against their father. Conrad, the eldest, was crowned king of Italy in 1093, after whose death (1101) Henry, the second son, succeeded in deposing his father from the imperial throne. Henry V., the creature of the Pope, soon became his opponent; but after a severe conflict concluded with Calixtus II. the concordat of Worms (1122). A main issue which remained unsettled gave rise to new difficulties in the 12th and

13th centuries—Matilda, countess of Tuscany, who died in 1115, by a will, the validity of which was disputed by the emperor, bequeathed all her property to the Papal See. Meanwhile, in the south, the Norman state, under Roger II., was formed into a kingdom, from the ruins of republican liberty and of the Greek and Lombard dominion (1130). In the small republics of the north of Italy the government was in most cases divided between the consuls, the lesser council (*credenza*), the great council, and the popular assembly (*parlamento*). Petty feuds developed their youthful energies. Such were those that terminated with the destruction of Lodi by Milan (1111), and the 10 years' siege of Como by the forces of the same city, allied with those of nearly all the Lombard cities (1118-27). The subjugation of this city rendered Milan the first power in Lombardy, and most of the neighboring cities maintained an alliance with her. Others formed a counter-alliance with her antagonist, Pavia. In Rome the love of liberty, restrained by Gregory VII., rose in proportion as his successors ruled with less energy. The schisms between Gelasius II. and the antipope Gregory VIII., Innocent II. and the antipope Anacletus II., renewed the hopes of the Romans. Arnold of Brescia (q.v.), formerly proscribed (1139) for his violent attacks against the luxury of the clergy in that country, was their leader (1146). After eight years Adrian IV. succeeded in effecting his execution. Frederick I. of Hohenstaufen (called Barbarossa) crossed the Alps six times, in order to defend his possessions in Italy against the republicanism of the Lombard cities. Embracing the cause of the Pavian union as the weaker, he devastated (1154) the territory of Milan, destroyed Tortona, and was crowned in Pavia and Rome. In 1158 he reduced Milan, demolished the fortifications of Piacenza, and in a diet at Roncaglia extended the imperial prerogatives conformably with the Justinian code, gave the cities chief magistrates (*podestà*), and proclaimed a general peace. His rigor having excited a new rebellion, he reduced Crema to ashes (1160), compelled Milan to submission, and demolished the fortifications (1162). Nothing, however, but the terror of his arms upheld his power. When the emperor entered Italy (1163) without an army, the cities concluded a union for maintaining their freedom, which in 1167 was converted into the Lombard Confederacy. In 1176 he suffered a severe defeat at Legnano, and was obliged to conclude a concordat with Alexander III., and a truce with the cities at Venice. Some years afterward a peace, which secured their independence, was signed at Constance (1183). The republics instead of strengthening their league into a permanent confederacy were soon split into new factions, most cities being internally divided into Guelphs and Ghibellines (q.v.). After Frederick II. returned from his crusade (1229), for undertaking which contrary to the will of the pope he was excommunicated, he waged war, with varying success, against the cities and against Gregory IX., heedless of the excommunication. The plan of Gregory IX. to depose Frederick, was followed by Innocent IV. in the Council of Lyons (1245), whither the Pope had fled to be out of the power of Frederick. This greatly weakened the Ghibelline party; the hitherto faithful Parma revolted; and the war between

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Guelfs and Ghibellines raged with greater fury than ever. In 1250 Frederick died, and his sons Conrad IV. and Manfred, endeavored to maintain themselves in the possession of their hereditary dominions in Lower Italy; but Innocent IV., who now returned to Italy, excommunicated them, and his successor, Urban IV., offered the crown of Naples to Charles of Anjou, brother of Louis IX. of France, who accepted the offer and landed at the mouth of the Tiber in 1265.

With Charles I. of Anjou, king of Naples, senator of Rome, and Papal vicar in Tuscany, the names of Guelfs and Ghibellines acquired a new signification. The former denoted the friends, the latter the enemies, of the French. Although with the fall of Hohenstaufen the power of the German emperors in Italy was practically at an end for the time, yet in Lombardy, and to some extent also in Tuscany, their supremacy was still at least nominally recognized; many Ghibellines still looked forward to a restoration of the Holy Roman Empire in Italy as the only means of reestablishing order, and others wishing to gratify their own schemes of ambition, often sought to obtain a legal authority for their usurpations by purchasing from the empire the title of imperial vicars. In Sicily, by the so-called Sicilian Vespers (1282), the French were driven out, and the crown of the island was bestowed upon Peter of Aragon, the son-in-law of Manfred, with whose help the inhabitants successfully resisted all the attempts of Charles of Anjou to recover the island, which remained separate from Naples for nearly 150 years. Thus the house of Aragon came to be the natural allies of the Ghibellines, as the house of Anjou were the allies of the Guelfs. To the factions of Guelfs and Ghibellines were added in the republics the parties of the nobility and the people. Everywhere in Middle and Upper Italy there was anarchy and civil war. The noble exertions of Gregory X. (who died 1276) to establish peace were of no avail; those of Nicholas III. (1277-81), who feared the preponderance of Charles, were more efficacious; but Martin IV. (1281-5), servilely devoted to Charles, destroyed everything which had been effected, and persecuted the Ghibellines with new animosity. A different interest—that of trade and navigation—impelled the maritime republics to mutual wars. The Genoese assisted Michael Palaeologus (1261) to recover Constantinople from the Venetians; at Meloria, they annihilated (1284) the navy of the Pisans, and completed their dominion of the sea by a victory over the Venetians at Curzola (1298). In Tuscany the party of the Guelfs formed themselves under the leadership of Florence and the influence of the Church into a league for the maintenance of national freedom against imperial power. Only Pisa and Arezzo remained attached to the Ghibelline cause. In Lombardy many towns, such as Novara, Lodi, Vercelli, Asti, Cremona, and above all Milan, formed themselves into a Guelph confederacy; but there was on the one hand an equally strong Ghibelline confederacy, consisting of the cities of Verona, Mantua, Treviso, Parma, Piacenza, Reggio, Modena, and Brescia. Freedom seemed to have expired, when the people, weary of the everlasting feuds of their tyrants, rose in most of the cities, and expelled them (1302-6), including the Visconti,

who had supplanted the Della Torre (1277) in the government of Milan.

Henry VII., the first emperor who had appeared in Italy for 60 years (1310), restored the princes to their cities. Florence alone undertook the glorious part which she so nobly sustained for two centuries, as the guardian of Italian freedom, chose Robert of Naples, the enemy of Henry, her protector for five years (1313), and remained free while Italy swarmed with tyrants. Robert also held the dignity of Papal vicar in the States of the Church during the pontificates of John XXII. and Benedict XII., the popes then residing at Avignon under the influence of France in what is known as the second Babylonian captivity. In the other cities a rule of tyranny existed, frequently changing from family to family, and therefore more oppressive. These petty princes, especially Della Scala, Matteo Visconti, and Castruccio, were a counterpoise to the ambitious views of Robert of Naples, son of Charles II. of Naples.

About 1334 Martino della Scala, master of half Lombardy and of Lucca, began to menace the freedom of Lombardy. Florence led the opposition against him, and excited a war of the league, in which it gained nothing but the security of its liberty. After the baffled Martino had sold Lucca to the Florentines the Pisans arose and conquered it for themselves (1342). In Rome, still torn by the feuds of the nobles, Cola di Rienzi (1347) sought to restore order and tranquillity; he was appointed tribune of the people, but was forced, after seven months, to yield to the nobility.

In 1348 the emperor Charles IV. made an expedition into Italy from which may be dated the gradual extinction of the political parties of Guelfs and Ghibellines. Charles had himself crowned king of Lombardy at Milan, and emperor at Rome, but he saw that neither of the Italian parties really desired foreign domination, and that the Ghibellines merely gave the empire their support for their own party purposes, and he therefore did not seek to strengthen himself by attaching himself to either party, but was content to add to his resources for the government of the empire in Germany by selling to the towns and princes the imperial rights in Italy. In 1425 the Venetians in alliance with the Florentines conquered all the territory of north-eastern Italy as far as the Adda, which they retained in the Peace of Ferrara in 1428. Milan, Venice (which possessed half of Lombardy), Florence (wisely managed by Lorenzo Medici), the States of the Church (for the most part restored to the Holy See), and Naples (which was incapable of employing its forces in direct attacks on other states), constituted, in the 15th century, the political balance of Italy, which, during the manifold feuds of these states, permitted no one to become dangerous to the independence of the rest, till 1494, when Charles VIII. of France entered Italy to conquer Naples as the inheritance of the house of Anjou. After an unresisted march through Italy Charles took possession of Naples; but a league was formed against him by the leading Italian states, who were joined by Ferdinand of Aragon, and he was compelled hastily to retreat, leaving only a small body of troops to protect his new conquest. In 1496 the whole of Naples was reconquered from the French and the Aragonese dynasty restored. Louis XII. the successor of

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Charles VIII., resumed the plans of the latter, and with Ferdinand of Spain as ally, having conquered Naples, fell to disputing as to the division of their conquest. War was declared between them, the result of which was that Ferdinand managed to retain the whole conquest for himself, which was thus reunited to Sicily and Aragon (1501-4). Louis was more successful against Milan, which he subjected in 1500. The attempts of Cesare Borgia, the son of Pope Alexander VI., to acquire the sovereignty of Italy were frustrated by the death of his father (1503), when the war-like Pope Julius II. completed the subjugation of the States of the Church. He concluded with Maximilian I., Ferdinand the Catholic, and Louis XII. the league of Cambrai (1508) against the ambitious policy of the Venetians, who artfully succeeded in dissolving the league, which threatened them with destruction. The Pope then formed the so-called Holy League with the Venetians themselves, Spain and the Swiss, for the purpose of driving the French from Italy. Maximilian Sforza, who had reacquired Milan (1512), relinquished it without reserve to Francis I. (1515) after the battle of Marignano, but the Emperor Charles V. assumed it as a reverted fief of the empire, and conferred it on Francesco Sforza, brother of Maximilian (1520). This was the cause of violent wars, in which the efforts of Francis were always unsuccessful. He was taken prisoner at Pavia (1525), and, with his other claims, was compelled to renounce those on Milan. In 1530 Florence, which through inner demoralization had lost its ancient love of freedom, was converted into a regular principality under Alessandro de' Medici, who was imposed on the Florentines by Charles V. Genoa, subject to the French since 1499, found a deliverer in Andrea Doria (1528). In 1553, beside Milan Charles V. conferred Naples on his son Philip II., and for a century and a half the Austro-Spanish influence was predominant in Italy. In the second half of the 16th century the prosperity of Italy was increased by a long peace, as much as the loss of its commerce allowed. Misfortunes in Germany compelled Ferdinand II. to confer both countries as a fief on Charles of Nevers, the *protégé* of France, whose family remained in possession till the war of the Spanish Succession. The peace of Italy was not interrupted during the second half of the 17th century, except by the attempts of Louis XIV. on Savoy and Piedmont, and appeared to be secured for a long time by the treaty of neutrality at Turin (1696), when the war of the Spanish Succession broke out. Austria conquered Milan, Mantua, and Montferrat (1706), retained the two first (Mantua was forfeited by the felony of the duke), and gave the last to Savoy. In the Peace of Rastatt (1714) Austria obtained, moreover, Sardinia and Naples; Savoy obtained Sicily, which it exchanged with Austria for Sardinia, from which it assumed the royal title. The house of Farnese becoming extinct in 1731, the Spanish Infant Charles, son of Elizabeth Farnese, daughter of the eldest brother of Antonio, the last duke of the Farnese family, obtained Parma and Piacenza. In the war for the Polish throne, of 1733, Charles Emmanuel of Savoy, in alliance with France and Spain, conquered the Milanese territory, and received therefrom, in the Peace of Vienna (1738), Novara and Tortona.

Charles, infant of Spain, became king of the Two Sicilies, and ceded Parma and Piacenza to Austria. The Medici of Florence, entitled, since 1575, grand-dukes of Tuscany, became extinct in 1737; and Francis Stephan, duke of Lorraine, then received Tuscany by the preliminaries of Vienna, and, becoming emperor in 1745, made it the appanage of the younger line of the Austro-Lorraine house. In the war of the Austrian Succession the Spaniards conquered Milan (1745), but were expelled thence by Charles Emmanuel, to whom Maria Theresa ceded in reward some Milanese districts. Massa and Carrara fell to Modena in 1743 by right of inheritance. The Spanish Infant, Don Philip, conquered Parma and Piacenza in his own name, lost them, and obtained them again as a hereditary duchy by the Peace of Aix-la-Chapelle (1748). Thus in the 18th century the houses of Lorraine, Bourbon, and Savoy possessed all Italy with the exception of the ecclesiastical territories, Modena, and the republics, which beheld with apathy operations in which they had no share. A quiet of 40 years ushered in their downfall.

The French revolution had a great influence on the history of Italy. From 1792 to 1797 Italy was overrun by the victorious French troops under Bonaparte and in the latter year the Pope purchased peace by the cession of Bologna, Ferrara, and Romagna in Italy, and Avignon in France; the payment of a money indemnity, and the surrender of art treasures. Bonaparte then advanced into Austrian Germany, and a rising having taken place among the Venetians in his rear, he made this a pretext for overthrowing the Venetian state. In October 1797 the Peace of Campo Formio was concluded, by which the Cisalpine Republic (q.v.) was formed out of the Italian territories which had been surrendered by Austria and the Pope, together with some sections taken from other powers. Austria received in compensation Venetia and Dalmatia. A few days later Sardinia concluded a treaty of alliance with France. The French then advanced toward Rome, overthrew the ecclesiastical government, and erected a Roman republic (1798). In Genoa, in the same year, Bonaparte occasioned a revolution by which a democratic republic was formed after the model of the French, under the name of the Ligurian Republic; and Lucca also was obliged to accept a republican form of government. In 1798 the second coalition against France was formed, and the king of Naples, instigated by his wife, a daughter of Maria Theresa, sent a Neapolitan army to attack the French at Rome. The French were at first driven out, but soon returned, and repulsed the Neapolitan army, forcing it to retreat into its own territory, where they followed it, and having taken the capital after an obstinate resistance, erected Naples into the Parthenopean Republic. The French directory also compelled the king of Sardinia to surrender his territories on the continent, and Piedmont and Tuscany received a military administration. In consequence of the victories of the coalition, the French were again driven out of Rome, Naples, and the rest of Italy except Genoa, and the king of Sardinia and the Pope returned to their capitals; but in the brilliant campaign of 1800 Napoleon destroyed all the advantages gained by the allies in Upper Italy, the most of which he reconquered. By the Peace

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of Luméville the possession of Venice was confirmed to Austria. The Duke of Parma received Tuscany, and afterward from Bonaparte the title of King of Etruria. Parma was united with France. The Cisalpine and Ligurian Republics were guaranteed by Austria and France, and with the Ligurian territories were united the imperial fiefs included within their limits. The king of Naples, who had occupied the States of the Church, was obliged to conclude peace at Florence. By Russian mediation he escaped with the cession of Piombino, the Stato degli Presidj, and his half of the Island of Elba, together with the promise of closing his harbors against the British. The other half of Elba Tuscany had already relinquished to France; but the whole island was obstinately defended by the British and Corsicans, with the armed inhabitants, and not evacuated till autumn. In January 1802, the Cisalpine Republic was transformed into an Italian republic, formed on the model of the new French constitution, and Bonaparte became president. Genoa also received a new constitution, and Girolamo Durazzo for doge. Piedmont, however, was united with France. After Bonaparte had become emperor in 1804 he attached (17 March 1805) the royal crown of Italy to the new imperial crown; he promised, however, never to unite the new monarchy with France, and even to give it a king of its own. The new constitution was similar to that of the French Empire. Napoleon founded the order of the Iron Crown, and having placed the crown on his own head at Milan 26 May, appointed his stepson Eugène Beauharnais viceroy of Italy. No European power recognized expressly the Italian kingdom of Napoleon. The emperor continued to strengthen his power against the active enemies of the new order of things. He seized Dalmatia, and annexed it to the kingdom of Italy. Guastalla, the Ligurian Republic, Parma and Piacenza were made French provinces. The Pope was obliged to sanction the imperial coronation by his presence. Naples was occupied by the French, and Napoleon gave it as a kingdom to his brother Joseph; and afterwards, in 1808, when Joseph was nominated to the throne of Spain, to Joseph Murat, grand-duke of Berg; while the English secured the rightful king Ferdinand in the possession of Sicily. In 1808 Etruria was annexed to France, and in 1809 Tuscany was given to Napoleon's sister Elise as a grand-duchy. In the same year (1809) the States of the Church were entirely united to France. After the Peace of Venice, Istria and Dalmatia were separated from the kingdom of Italy, and incorporated with the newly-created kingdom of Illyria. Bavaria was obliged to cede to Italy the circle of the Etsch (Adige) in the Tyrol, a part of the circle of Eisack, and the district of Clausen.

The power of the French emperor was, to all appearance, as firmly established in Italy as in all Europe, but after the fatal retreat from Russia, Murat, whom Napoleon had personally offended, deserted the cause of France, and joined Austria, whose army penetrated into Italy under Bellegarde. After the truce of 21 April 1814, the French troops evacuated Italy, and most of the provinces were restored to their legitimate sovereigns. But before the Congress of Vienna had organized the political relations of Europe, Napoleon escaped from Elba and effected his return to France, 1 March 1815. At

the same time Murat, king of Naples, abandoned his former ambiguous attitude, and took up arms, as he pretended, for the independence of Italy. But his appeal to the Italians was answered by a declaration of war by Austria. Driven from Bologna by the Austrian forces, and totally defeated by Bianchi at Tolentino, he lost the kingdom of Naples, seven weeks after the opening of the campaign. Ferdinand IV. returned from Palermo, and Murat's family found an asylum in Austria. Murat himself made a descent in Calabria from Corsica, in order to recover his lost kingdom, but was taken prisoner at Pizzo, brought before a court-martial, and shot 14 Oct. 1815.

Meanwhile the Congress of Vienna had arranged the affairs of Italy, so that Austrian predominance was again more firmly established than ever in Italy.

The result was to leave the country in the same divided condition and among the people. The spirit of Carbonarism (see CARBONARI), having for its object the union of Italy under one government, threatened to subvert the political institutions. In Naples and Sicily, in 1820 Ferdinand I. (IV.) was compelled to promise a constitution similar to that granted to Spain in 1812; and in Sardinia, Victor Emmanuel abdicated in 1821 in favor of his brother Charles Felix. But Austria, as the power most nearly concerned, undertook, with the approbation of the other powers assembled at the Congress of Laibach, to restore despotism in Naples and Sicily as well as in Sardinia. The system of repression was carried out with the utmost rigor, and great cruelties were practised in Naples and Sicily, even on those who were only the objects of political suspicion.

The arbitrary proscriptions and imprisonments aroused a deep hatred of the government, and when, in 1830, in consequence of the French revolution, a general spirit of revolt spread itself throughout Europe, the Italians considered the state of events a favorable conjuncture for striking a blow for national and political freedom. But the hopes of the patriots were soon quenched. The risings in Modena, Parma, and Bologna were suppressed by Austrian troops, and the reigning princes who had been driven out of the first two states returned to their dominions. In the States of the Church the papal troops, recruited from banditti and criminals, were employed to put down the uprisen provinces, and they behaved with so much violence that Austrian forces were necessary to defend the government and country from their own soldiers. In order not to allow all the power in Italy to fall into the hands of the Austrians the French suddenly occupied Ancona in February 1832, and retained it for several years. In 1834 an invasion of Savoy from Switzerland by a band of Italian and Polish exiles under the Genoese Ramorino, undertaken with the purpose of overthrowing the Sardinian throne, and then in conjunction with the Italian patriots, headed by Mazzini, who gave themselves the name of "Young Italy," bringing about a revolution throughout the whole country, ended in a miserable failure.

But the unwearyed activity of the secret societies, more especially of Mazzini's "Young Italy," with its republican tendencies, diffused itself over a great part of the peninsula. In 1838 Ancona was evacuated by the French; and

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at the same time the Austrian troops quitted the Papal States, while the amnesty, proclaimed a short time previously in Venice and Lombardy, appeared to produce a lasting conciliatory effect on the minds of the people. Pope Gregory XVI. died in June 1846, and the election of Cardinal Mastai Ferretti to the papacy under the name of Pius IX. seemed to mark an epoch in the history of Italy, for the spirit of reform which he introduced into the government of the Papal States soon spread to Tuscany and Sardinia. But Naples and Austria strongly opposed the new system of politics. Naples suppressed the violent attempts made in the summer of 1847, without putting a stop, however, to the increasing ferment. In Lombardy, Austria maintained the old system, and by the investment of Ferrara in August 1847 made an unmistakable declaration against the papal policy. Throughout the whole of Italy a hatred of the Austrian sway was systematically cherished, and to the whole movement a hostile direction was gradually given against Austria. In January 1848 the inhabitants of the island of Sicily were in rebellion, demanding a constitution and ultimately the complete severance of the island from the continental government.

At this juncture occurred the French Revolution of 1848, and the reserve which had hitherto prevailed in Upper Italy was thrown aside, and the overwhelming intelligence of the insurrection in Vienna soon completed the universal eruption. The insurrection at Milan, on 22 March, followed by similar commotions throughout almost the whole of north Italy, compelled the Austrian army, under Field-marshal Radetzky, to evacuate the capital and retreat to Verona; while, at the same time, Venice, by the hasty capitulation of the authorities, recovered its independence, and the reign of despotism came to an end in Parma and Modena. Charles Albert, king of Sardinia, with the hope of making himself master of the Lombardo-Venetian kingdom, and carrying out his idea of a national Italian confederacy, declared war with Austria, and, supported by numerous Italian free companies during the first period of enthusiasm and surprise, drove back the enemy's troops to the northern frontier of Italy. But on 6 May Radetzky (then in his 82d year) successfully withstood the attacks of the Italians at Santa Lucia, not far from Verona, and on 25 July gained at Custoza a second bloody victory, which resulted in the reconquest of Milan and the whole of Lombardy. The king of Sardinia made his escape by night into his own territories, and then concluded an armistice with the victors. Pushed on by the democrats, Charles Albert renewed his attempts in the following year (1849), but in a campaign of five days (20-24 March) the old field-marshall put a speedy termination to the enterprise, and frustrated the hopes of the Italian patriots. Charles Albert, despairing of his fortunes, abdicated in favor of his son, Victor Emmanuel, and fled from his dominions. The young king then concluded a disadvantageous peace with Austria. Venice, favored by its position, resisted for some months longer the besieging army of the Austrians, but was at last obliged to surrender (25 Aug. 1849). In other parts of Italy events had meanwhile taken a similar course. In Rome, where Pope Pius IX., alarmed at the sudden outburst of revolutionary projects, checked himself in his career of reform,

the excitement grew to such a pitch that he lost all control of his subjects. In vain he promised a constitution and summoned an assembly of the states to the capital. His minister Rossi was assassinated in November 1848, whereupon the democrats took all the power into their own hands. The Pope fled in terror to Gaeta, leaving his capital in the hands of the populace and the insurgent volunteers, who proclaimed a Roman republic, and even laid hands on the Church property (February 1849). Mazzini, the active head of "Young Italy," and Garibaldi, the leader of the volunteers, ruled in Rome. The Pope appealed to the protecting states for help, and a French army under Gen. Oudinot marched up to the walls of Rome and demanded the restoration of the old order of things. When this was refused the French proceeded to lay siege to the city, but met with so determined an opposition that it was only after frequent bloody contests, extending over several weeks, that the city fell into their hands (July 1849). The republicans sought safety in flight, a French garrison was permanently posted in Rome, and under the protection of French bayonets the old condition of affairs was gradually restored. The insurgent Sicilians had no better success than the Lombards, Venetians, and Romans, being gradually subdued by the Neapolitan arms. In Tuscany, as in Rome, the democrats for a short period obtained the upper hand and compelled the grand-duke to flee, but the republican form of government lasted only a few weeks. Sardinia, therefore, remained the only state which preserved the constitutional benefits resulting from 1848, and strenuously withstood all requisitions to act otherwise. The Lombardo-Venetian kingdom entered the states of the Austrian union, whilst, notwithstanding some isolated conciliatory measures, such as the reestablishment of a free port at Venice, the system of military dictatorship was still maintained. In Rome, which the Pope again entered in April 1850, the new organization of the state restored the spiritual rule, with a silent abrogation of the constitution of 1848. In Naples the last miserable shadow of freedom was abolished, and against the originators and promoters of the insurrection of 1848 there was opened an array of legal proceedings, the tyrannies of which engaged deeply the attention of foreign countries. In Tuscany, which was occupied by Austrian troops and wholly bound to Austria by a military convention, despotism and priestly power returned in all their force. In Modena and Parma the returned princes, relying on the protection of Austria, pursued a policy of revenge and repression against the adherents of a free political life. In such circumstances the condition of Italy, harassed and unsettled, presented a most melancholy picture; nor could some important non-political improvements, including the formation of railways, the accession to the Austrian postal union, and the freedom of the navigation of the Po, effect any satisfactory amelioration. In Naples the cruelties exercised on political prisoners led to a cessation of intercourse between that state and Great Britain, and Austrian oppression in Lombardo-Venetia, the misgovernment of the Papal States and of the duchies, abetted by Austria, led to the war of 1859, when France, siding with Sardinia, defeated the Austrians at Magenta (4 June) and Solferino (24 June), and drove them out of Lombardy,

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after which Francis Joseph, emperor of Austria, in a personal interview with Napoleon III., emperor of the French, at Villafranca, agreed to the preliminaries of a peace, stipulating for the surrender of Lombardy, as far as the line of Peschiera and Mantua, by Austria to France, the formation of a confederacy of Italian states under the presidency of the Pope, and the return of the princes who had been expelled in the course of the war from their dominions by their subjects, provided that their return was not effected by foreign intervention, but only by the will of their subjects. Of these three preliminaries only the first was ultimately ratified by the Treaty of Zurich (10 Nov. 1859). Lombardy was ceded to France, who gave it up to the king of Sardinia, in return for which the latter ceded to France, some time later, Savoy, the ancestral domain of his family, and Nice. The other two stipulations of the preliminaries of Villafranca were not carried out. So far from inviting back their banished rulers, the inhabitants of the duchies hastened to summon assemblies to pronounce their deposition, and to annex themselves to Sardinia. Even Bologna withdrew from the papal rule, and put itself under the protection of Victor Emmanuel. In March 1860, popular votes were taken in Savoy, Nice, Tuscany, Parma, Modena, and the four northern papal legations constituting Romagna, in virtue of which the cession of the first two to France was carried into effect, and the remainder were incorporated in the kingdom of Sardinia. Neither the protests of Switzerland against the surrender of the districts on the south of the Lake of Geneva, nor the ban of excommunication pronounced by the Pope on the chief actors in these events, could prevent them from taking their course. Meanwhile the victorious career of Garibaldi in Sicily and lower Italy had led to the dethronement of the king of Naples, and the detachment of the provinces of Umbria, Urbino, and the Marshes, with Benevento and Pontecorvo, enclosed by the kingdom of Naples, from the states of the Church; and Sardinia intervening to complete the revolution, the whole of Italy and Sicily, except Rome and its vicinity and Venetia, was combined in a united realm, which, in 1861, was proclaimed as the kingdom of Italy, with Victor Emmanuel as its sovereign, the temporal power of the Pope being secured by French troops stationed in Rome. In the war which broke out in the spring of 1866 between Prussia and Italy combined on the one side, and Austria on the other, the Italian invasion of Venetia was repulsed in the battle of Custoza 24 June; but the Austrians, suffering heavy reverses from the Prussians, ceded Venetia to the emperor of France, by whom its destiny was put to the vote of its inhabitants. Their vote being in favor of union with Italy, the province was accordingly joined to it. There was still one part of the Italian territory not included in the kingdom of Italy, namely, the Papal States, where the Pope continued to maintain his temporal authority under the protection of French troops. According to a convention concluded between France and Italy, 15 Sept. 1864, these troops were to be withdrawn in the course of the year 1866. This was, indeed, actually done, but their place was taken by a corps levied in France and commanded by the French general Dumont, whom

Napoleon sent in July 1867 for the purpose. The protestations of the Italian government were of no avail, but on the outbreak of the Franco-German war the French troops were withdrawn, and after the fall of the empire in consequence of the defeat at Sedan, the Italian government could no longer resist the demands of the press and of popular feeling, and occupied the Papal States (September 1870), soon after which they were annexed to the kingdom of Italy. While the Pope was deprived of his temporal dominions, his spiritual independence was guaranteed. In 1871 the seat of government was removed to Rome from Florence (having until 1865 been at Turin). In 1878 Victor Emmanuel, the first king of united Italy, died, and was succeeded by his son Humbert. The acquisition of territory in Africa was pursued with vigor from 1880 until 1896, when a conflict with Abyssinia and a severe defeat of the Italian troops at Adowa checked colonial enterprise. Humbert was assassinated in 1900 and was succeeded by his son Victor Emmanuel III. Italy, with Germany and Austria-Hungary, form the Triple Alliance, having in view the preservation of the peace of Europe.

Language.—Ancient Italy is supposed to have had a common language of many dialects. That which is common in all these dialects is the heirloom of the Indo-European stem; while that in which they differ either belongs to other stems of languages, or is of later origin. Leonardo Bruni (15th century), Cardinal Bembo ('Prose, nelle quali si ragiona della volgar lingua,' Venice, 1525), Saverio Quadrio, etc., assert that it is as ancient as the Latin; that both were used in Rome, the Latin in public speeches, in legal documents, and by the learned, while the *Romanus rustica* was spoken by the people and in private conversation. The Latin, having been Grecized, became so to speak, stereotyped and sterile, and died away with the aristocracy; whereas the vulgar speech, carelessly spoken, and poor in grammatical forms, continued to live. Ciampi traces the use of the language to the 5th century. Gonzo (about 960) attests its use among the better educated portion of the inhabitants; and Wittekind mentions that the emperor Otho I. (936-73) spoke both the *lingua Romana* and the *lingua Slavonica*. Pope Gregory V. (996) instructed the people in the same. The opinion, therefore, that the Italian was formed as late as the 11th century, is groundless. In the 13th century the Italian improved rapidly in pliability, elegance, and soon also in regularity, so that in grammar and lexicology it approached in the 14th very much the form it has now. With the exception of the Icelandic, all other modern European languages were yet in their infancy. Dante did most of all toward developing and consolidating the native elements, in legitimizing the exotic accessions, and in polishing the whole language, which he calls *illustre*. Petrarch (died 1374) and Boccaccio (1375) rendered Dante's idiom more mellow and popular; the former by imparting to it the polished suppleness of the Provençal, the latter by emboldening it to express all shades of thought.

Little was done in promoting the language in the 15th century, but the 16th endowed it with choice terms of art, in consequence of antiquarian researches. Nicolo Macchiavelli (1469-1527) was

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the father of Italian prose. Pietro Bembo (died 1547), Giovanni Ruccellai (1526), Jacopo San-nazaro (1530), G. G. Trissino (1550), Ariosto, Tasso, Guarini, etc., raised it above all other European languages. Aug. Beolco di Ruzzante (Venice, 1565) wrote six comedies, in which each person speaks his native dialect; a method analogous to the use of Prakrit in Indian dramas. Benedetto Varchi ('L'Ercolano,' etc., Florence, 1570) reformed the orthography and established the grammar. Grazzini with Leonardo Salviati founded, in the *accademia della crusca* at Florence, a tribunal of the language (1582). The influence of French on European languages during the 17th century began to be exerted on the Italian, especially on its syntax. Algarotti was the chief fosterer of this influence. But Monti ('Correzioni al vocabolario della crusca,' and in other works) and Perticari strenuously and successfully resisted this denationalization, and restored to their cherished tongue the glorious direction imparted to it in the 14th century. The area of the Italian language comprehends the whole peninsula and the islands of Sicily, Sardinia, Corsica, etc.; the Swiss canton of Ticino, and parts of the Grisons and Valais; South Tyrol, some cities of Istria and of Dalmatia, and partly the Ionian islands. A rough idiom of Mediterranean navigators, and a jargon known as the *lingua franca*, are spoken in the Levant. Dante's *parlare illustre* (also *cardinale, aulico, cortigiano*) is common to all well educated Italians. Many of the dialects differ as much from it as it differs from Spanish, and some even more. This is owing to the ancient local varieties of the *Romana rustica* and of others, as well as to the tongues of foreign invaders. Dante ('De Vulgari Eloquio') speaks of 14 dialects, one class on the west, the other on the east of the Apennines. Those on the north approach the Provençal language.

Literature.—The Italian language molded into a peculiar shape, different from the Latin, and free from most of the rough and uncouth words and phrases which the invading hordes of northern barbarians had introduced into it, the Emperor Frederic II, who resided in Palermo till the commencement of his reign in 1212, made the language of his court. He gathered there many men who delighted in composing verses, and founded the university of Naples, and schools in Palermo and other Sicilian cities. More celebrated as a poet than either himself or his two sons, Enzio and Manfred, was his secretary Pietro delle Vigne, who was wont to go about singing his songs in the newly formed language, some of which have been preserved and are deserving of praise. From Sicily the taste for literature seems to have spread to other parts of Italy. Foremost among the succeeding authors were the Bolognese Guido Giuncelli (died in 1762), mentioned most honorably by Dante in many of his works, Guido Ghislieri, Fabricio, and Onesto. In Tuscany also appeared Guittone d'Arezzo (died in 1294), Bonagiunta da Lucca, Gallo Pisano, Mino Macato Sanese, Brunetto Fiorentino, and others. Several sonnets and songs of Fra Guittone are preserved, and also 40 letters to a friend, the oldest specimen of the epistolary style in Italian. Dante criticises his compositions as languid and unimpassioned.

Brunetto Latini (about 1260) was the teacher of Dante and the author of 'Il Tesoro,' written first in French and afterward translated into Italian, in which he aimed to give a cyclopædic view of the state of knowledge at that time. He also wrote the 'Tesoretto,' consisting of moral sentences in seven-syllabled rhyming couplets. Guido Cavalcanti (died in 1300), one of the best friends of Dante, was styled by Benvenuto da Imola the second eye of Italian literature, of which Dante was the first. He was a philosophic poet, and his verses gave him a reputation for learning, and show that he had a deep knowledge of human heart and was accustomed to moral reflections. The first book in Italian prose was the 'Chronica' by Matteo Spinnolo, a Neapolitan, relating the history of events from 1247-68. The honor of writing history in a neat style belongs also to Ricordano Malespini, a Florentine, who died about 1281. The 'Agricoltura' and other scientific works of Pietro Crescenzi, a Bolognese, show in several respects a thorough knowledge: but in attempting to explain vegetation and other natural phenomena after the theories of Aristotle, he fell into the errors prevalent in his age. In the 13th century began the glorious literary era of Dante, Petrarch, and Boccaccio. Dante (1265-1321) rose like a sun, and shone on Italy with an unparalleled splendor, giving to that nation almost a new life. He raised the language from comparative rudeness to the highest refinement, conceived a poem which is admitted to be one of the sublimest creations of the human mind, and charmed a people yet groping in ignorance and barbarism by the sweetness, beauty, and grandeur of his delineations, compelled them to listen to the dictates of morality and Christianity, and proclaimed the principles from which alone they could hope for rest from the desolation of civil wars. Involved in the intestine discords between the Guelfs and Ghibellines and the parties *dei bianchi* and *dei neri*, his works bear the impress not only of the ideas but of the conflicts of his time. His masterpiece is the 'Divina Commedia,' incomparably the greatest of Italian epics. It was so called because he conceived that there were three kinds of style, the sublime, the middle or comic, and the lowest of all, which he called the elegiac, and he selected the second of these for his poem. Even in this finest product of his genius he supported the emperor and the Ghibelline party against their enemies the Guelfs. He depicted an inferno in which were placed those petty tyrants and chieftains who had filled Italy with the horrors of civil war. He described a purgatory in which those men were punished who with too little heroism and firmness had maintained the cause of justice and their country. He finally pictured a paradise in which those were rewarded who had devoted themselves only to virtue, and had labored for the commonwealth with strong hearts and magnanimous deeds. There he imagined a throne to be raised, and a crown upon it, as a reward for that Henry who, he hoped, would restore Italy to her ancient power and splendor. This political aim of the 'Divina Commedia' was only incidental to its moral and religious meanings. The work displays an immense amount of theological as well as philosophical and historical knowledge, and contains some ingenious scientific

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views, which were fully developed and understood only after several centuries. It is for these that Redi, Magalotti, and other scientific writers quoted from him in preference to any other poet. The unfinished 'Convito' of Dante is called by Monti the first sound and sober prose writing that Italian literature can boast, and the first on moral philosophy. Dante abandoned the Latin language, in which he had begun to write, for the Italian, the perfection and embellishment of which he deemed would be of great advantage toward uniting Italy. In his Latin treatise 'De Vulgari Eloquio' he maintained that no one of the Italian dialects merited the name of the Italian language, which was rather the language spoken in all the cities, without belonging to any one in particular. Francesco Stabile, called also Cecco d'Ascoli (burned for heresy at Florence in 1327), wrote the 'Acerba,' a witty poem, directed against Dante and Guido Cavalcanti, and treating of natural and philosophical subjects with little wisdom or eloquence. It is in strophes of eight verses, the last two rhyming, and some have therefore ascribed to him the honor of inventing the *ottava rima*. More highly esteemed was Fazio Bonifazio degli Uberti (about 1367), who wrote in *terza rima* the long allegorical poem of 'Dittamondo' (*Dicia Mundi*). Cino da Pistoja (1270-1336) excelled both in jurisprudence and poetry. His songs were in praise of Selvaggia, a lady of whom he was enamored, but his legal work 'Il comento' is of greater importance, and displayed an erudition which gained him invitations to lecture in many universities. Dante commended him as an improver of the language, and Petrarch lamented his death in touching verses. Petrarch (1304-74) had seen Laura de Sade at Avignon, who was the inspiration of the charming verses to which he owes his immortality, and had produced his Latin poem of 'Africa,' on which by a strange misjudgment he chiefly prided himself, when in 1341 he received the laureate crown in Rome. The noble delicacy and tenderness of affection which make him so distinctively the poet of love were hardly his principal merits. All men who honor and cherish learning and patriotism, revere his name, who left as an heritage the precept and example of seeking to end the intestine discords of his country by elevating it to a worthier life. His principal philosophical treatises and poems, in Latin, demonstrate his erudition, justness of philosophical thought and sentiment, and exquisite skill in Latin composition. He has a greater celebrity as the father of Italian lyric poetry. In this department he surpassed all his predecessors, and has been equaled by none of his numerous successors and imitators. A less versatile author was Giovanni Boccaccio (1313-75), who abandoned successively commerce and law for literature, studied with ardor the 'Divina Commedia,' and cherished the friendship of Petrarch. He wrote several works in Latin, and made an expensive collection of Greek manuscripts, but is chiefly known as the author of the 'Decamerone,' and thereby as the father of Italian prose. The 'Decamerone' (ten days) is so called because each of the 10 persons introduced into it, seven ladies and three young men, relates 10 stories per day, 100 stories being thus told in 10 days. The scene is a villa in the vicinity of Florence, whither

they had fled from the plague (1348), and the description of that pestilence with which the work opens is admired as a masterpiece of eloquence. Its real object seems to have been to present a picture of the whole human family, and to encourage virtue by commendation and to correct vice by ridicule. Its beauty of composition is, however, sometimes expended on the most indelicate subjects. The 'Cento novelle antiche' are for the most part written from those of Boccaccio, but some are of earlier date. They relate short adventures in a graceful and simple style, free from indelicacy. Franco Sacchetti of Florence left 300 tales, of which 258 are preserved, written carelessly but with great purity. The 'Pecorone' of the Florentine Ser Giovanni, an imitation of the 'Decamerone,' contains about 50 tales. This was the age of chroniclers as well as novelists. Dino Compagni chronicled the history of Florence from 1270 to 1312 with truthfulness and elegance. More celebrated is the work of Giovanni Villani, containing the history of the city from its foundation till a few years before his own death by the plague in 1348. His work was continued with greater prolixity by his brother Matteo to 1363, when he also fell a victim to the plague; and to 1364 by Filippo the son of the latter, who also wrote a series of biographies of illustrious Florentines. The 'Specchio della vera penitenza' of Giacopo Passavanti (died in 1357) is the first example of an ascetic work in the vulgar tongue, and its style is comparable for excellence with that of Boccaccio. Various similar treatises were written by Domenico Cavalea of Pisa; the 'Ammaestramenti degli antichi,' by Bartolomeo da S. Concordio, merits particular praise; and the 'Trattato del governo della famiglia,' by Agnolo Pandolfini (1365-1446), is equally esteemed for its happy and useful choice of materials, and for its natural and graceful style, adorned with all the skill which the writers of his age may boast. Most of the men who flourished in the 14th and 15th centuries were not distinguished like Dante and Petrarch for creative genius, but delighted rather in reproducing and commenting on the authors of antiquity. The printing-press, invented in Germany, was most usefully employed in Venice, Bologna, and Rome, in multiplying copies of the ancient authors, corrected by learned scholars. To the passion for discovering and publishing new manuscripts was joined that of finding and interpreting ancient monuments, medals, inscriptions, and sculptures. Only the first steps toward a new civilization had been taken by Petrarch and Boccaccio. The introduction of the mariner's needle by Flavio Gioja had opened the ocean to the Europeans; the travels of Marco Polo had awakened that curiosity concerning the way to the East Indies which led Columbus to the discovery of the new world; the Arabic numerals had been substituted in Italy for the Roman; academies were established to nurture the love of letters, and courts became an asylum for the most distinguished men; and the popes in Rome, the Medici in Florence, the houses of the Visconti and the Sforzas in Milan, and of the Gonzagas and Estes in Mantua and Ferrara, became protectors of literature and the arts. Pope Nicholas V. is especially distinguished for the encouragement which he gave to every branch of learning, and for the generous sacrifices which he made in col-

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lecting books. It was under his liberal protection that Francesco Filelfo translated the 'Iliad' and the 'Odyssey' into Latin verse. His example was followed by numerous courts in Italy. Lodovico invited to his court in Lombardy many learned men, painters, and architects, among whom were Leonardo da Vinci and Bramante, founded the university of Pavia, granting it many privileges, and opened schools in Milan, to which most renowned professors gave distinction. But the most illustrious of the patrons of letters was Cosmo de' Medici. He founded one library in Venice and three in Florence, and established the first academy for the study and promulgation of the Platonic philosophy. Pico della Mirandola and Cristoforo Landino exercised the happiest influence in advancing and creating a popular esteem for knowledge, and especially in exciting the Florentine youth to an enthusiasm for it. The former was almost unrivaled in erudition, and seemed to possess a miraculous memory, being profoundly and prematurely versed in numerous languages, in metaphysics, and in mathematics. Lorenzo de' Medici (died in 1498) greatly and variously increased the glory which his uncle had acquired in the culture of learning. But it is lamentable, after the three great masters of the Italian tongue which the preceding age had presented, that the taste of the learned returned to the Latin language. To such a degree was Italian neglected, that it was hardly used at all in writing; it was even disdained for legal documents, and its development was arrested by a boundless reverence for antiquity. But Lorenzo the Magnificent may be considered the reviver of Italian literature, and was even called its father. Most esteemed for his virtues and manners, he enriched libraries, reopened the university of Pisa, collected numerous remains of antiquity, promoted the study of the popular poetry, and wrote himself many admired pieces for the improvement of the public taste. His 'Nencia da Barberino' is the first example of Italian rustic poetry, and his 'Compagnia del Mantellaccio' seems to have given the first idea of Italian satire in *terza rima*. Under him Florence became a new Athens. Angelo Poliziano (1454-94) enjoyed the friendship of Lorenzo, attained to great erudition, and was an elegant writer both in Italian and Latin. His most celebrated works are the 'Stanze,' which were imitated even by Ariosto and Tasso, and the 'Orfeo,' the first regular and consistent Italian drama. Contemporary poets of less note were Burchiello, Girolamo Benivieni, and Giusto de' Conti. To the various kinds of composition which have thus far appeared must now be added some epics. Of the brothers Bernardo, Luca, and Luigi Pulci, only the last (1431-87) achieved lasting eminence in poetry. His 'Morgante Maggiore,' burlesque and fantastic, opens the brilliant Italian series of romantic poems of chivalry. It belongs to the circle of legends concerning Charlemagne and his paladins, but degrades the primitive simple faith in them by persiflage. The 'Mambriano' of Cieco da Ferrara deserves to be mentioned and compared with the 'Morgante.' The best of the romantic poems of the 15th century is the 'Orlando innamorato' of Boiardo, which introduced materials so beautiful and so vast as to induce Ari-

osto to follow in the same path. To sustain the marvels of his subject, he employed magicians and fairies in connection with the classic divinities, and beneath the veil of poetry he represented the most useful truths of philosophy. The 'Orlando innamorato' was left incomplete, and the original has become rare even in Italy, on account of its rude and antique diction. Its tone is much modified in the elegant elaboration of it by Berni, which has enjoyed the most general favor. The prose literature was enriched by the writings of two artists: Leon Battista Alberti, the author of a dialogue 'Della famiglia,' containing philosophical precepts for domestic life and the education of children, and of treatises on painting and architecture which gained him the name of the Italian Vitruvius; and the renowned Leonardo da Vinci (1452-1519), at once painter, sculptor, architect, mathematician, musician, the best extemporeous poet of his time, and the author of a 'Trattato della pittura,' which reveals both his scientific and artistic knowledge, and is a classical authority on the use of terms pertaining to the arts and sciences. Numerous historians, also, belong to this age. Pandolfo Collenuccio was the first to write an esteemed history of the kingdom of Naples, revived and corrected the taste for comedy, founded the first museum of natural history in Europe, and wrote dialogues after the manner of Lucian, and the solemn poem of 'Inno alla morte.' Historians of travels were the Genoese Giorgio Interiano and the Venetian Cadamosto, who give the oldest narratives of the Portuguese discoveries, and the Florentine Amerigo Vespucci. Aldo Manuzio (Aldus Manutius) rendered signal services to letters, and gained a European repute by the care and taste with which he published the classics. The 16th century, in respect of Italian art and literature, is surpassed by none in modern history, and rivals the ages of Pericles and Augustus in antiquity. A family of great names occurs, each of which might form an epoch. Leo X. was the most illustrious of a series of papal patrons, bestowing liberal rewards not only on authors but on Raphael and Michelangelo. After the extinction of Florentine liberty, literature was again protected by various reigning families. Cosmo de' Medici commanded Varchi to write his history without any regard to persons, and we therefore owe to him a narrative of the crimes by which his own family attained the sovereignty. Under his son Francesco the learned institutions already in existence were advanced, and the academy *della crusca* was founded. The court of the Estes in Ferrara entertained Ariosto and Tasso; most of the other courts, great and small, as those of the Gonzagas in Mantua, of the dukes of Urbino, and of Manuel Philibert of Savoy, were hospitable to scholars and poets; and numerous literary academies with capricious names, as those *dei sonnacchiosi*, *degli storditi*, and *dei selvaggi*, were instituted. Pre-eminent among the poets of the age rose Ariosto (1474-1533), called the Ferrarese Homer, who aimed to celebrate in a great poem the origin of the house of Este. The loves and exploits of Bradamante and Ruggiero, imaginary ancestors of that house, form the basis of his romantic epic, the 'Orlando furioso,' the subject of which is the war of the Saracens against Charlemagne. The courtesies and hero-

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isms of knights, the loves of ladies, and the madness of Orlando give occasion for most various and always natural pictures, all the passions being delineated in appropriate colors, so that Tasso affirmed the excellence of Ariosto not only in versatility of invention but in propriety of treatment. Many of his similes are unsurpassed in simplicity and grace. Beside his masterpiece, he wrote satires on the politics and the rulers of his time, and his 'Negromante' and 'Zanotti' almost entitle him to be called the father of Italian comedy. Bernardo Tasso, the father of Torquato, was the author of the 'Amadigi' and other esteemed poems. His more renowned son (1544-95) strictly followed Virgil and Homer in the form of his 'Gerusalemme liberata,' but its finest ornaments belong to the romantic spirit of his age. To the classical mythology it adds the marvels of enchantment and magic. The greater merits of the 'Gerusalemme' have caused his 'Rinaldo' and his pastoral drama of 'Aminta' to fall into undeserved neglect. Some of his sonnets also, and other minor pieces, possess a rare beauty; and his prose letters and moral dialogues are remarkable for their eloquence and philosophical tone. Inferior to the epics of these great masters are the 'Girone il cortese,' treating the legends of King Arthur, and the 'Avarchide,' describing the siege of Bourges, by Alamanni, who also wrote the 'Coltivazione,' a specimen of monotonous harmony. Rucellai is the author of a short and carefully finished didactic poem, entitled 'Le api.' Valvagone wrote in the 'Angelede' a description of the battle between the good and rebel angels, from which Milton is supposed to have derived materials. The 'Italia liberata dei Goti,' by Trissino, is in every respect a wretched imitation of Homer; but his 'Sofonisba' is the first Italian tragedy of high merit. Leo X. himself witnessed the production of the 'Rosmunda' and the 'Oreste' of Rucellai. Better tragedies are the 'Tullia' of Martelli, the 'Canace' of Sperone Speroni, the 'Torrismondo' of Torquato Tasso, and the 'Epido' of Andrea dell' Anguillara, all of which display a too servile imitation of the Greek authors. The Latin comedy, meantime, was made too strictly the model of the Italian. The learned comedy (*commedia erudita*) was cultivated at almost the same time by Cardinal Bibbiena, Ariosto, and Macchiavelli. The best examples are the 'Cassaria' and 'Suppositi' of Ariosto, the 'Calandra' of Bibbiena, and the 'Madragola' and 'Clizia' of Macchiavelli, the last especially remarkable for their knowledge of men. The 'Pastor fido' of Guarini deserves especial mention as one of the pastoral poems with which Italy abounded, inferior at furthest only to the 'Aminta' of Tasso. At this period a new and brilliant step was taken by the Italians in the dramatic art, by the union of music with poetry. The invention of the opera belongs to the Florentines, the first having been the 'Daphne,' the words of which were by Rinuccini and the music by Peri, and which was represented in 1597. Orazio Vecchio of Modena produced melodramas, which Maturatori regards as the beginning of the modern opera. The attraction of this new style was so great that authors and musicians immediately devoted themselves to it in Italy, and it was soon introduced into Germany and France. Every variety of poetry seems to have been tried in

this age with success. Berni was the head of a school of burlesque poetry, called from him the Bernesca rhyme. The best of his pieces, the 'Orlando innamorato,' possesses grace, elegance, and originality. One of his imitators was Agnolo Firenzuola, who is more esteemed for the amenity of his prose writings. To Ariosto belongs the first place among the satirical as well as romantic poets of his age. Scarcely comparable with him are the satirists Ercole Bentivoglio, Nelli, and Luigi Alamanni. Pietro Aretino (1492-1557), the most indelicate of Italian writers, evinced a versatile and brilliant genius in almost every style of composition. The monk Folengo (died in 1544), better known under the name of Merlino Coccajo, was either the inventor or one of the first and happiest improvers of macaronic poetry. Superior to a crowd of rhymers, imitators of the ancients or of Petrarch, was the sculptor Michelangelo, whose style was influenced by the study of Dante. Pietro Bembo (died in 1547) was the restorer of elegance and correctness to the native language, and revived its popularity among the learned. Francesco Maria Molza excelled in thoughtful and humorous poetry. The 'Galateo' and other writings in prose and verse of Giovanni della Casa are still esteemed for vigor of thought and beauty of expression. The translations of many of the classics into Italian by Annibale Caro (1507-66) are accounted by some critics superior in style even to the compositions of Petrarch. His versions have an air of originality, and it was said that Virgil would hesitate whether to give the palm to his own work or to that of his translator. His original writings obtained the highest praise for elegance. The sonnets of Angelo di Costanzo have been said to combine every merit of which the sonnet is capable. He wrote also a history of Naples. The most eminent poetess of this age was Vittoria Colonna, highly applauded by Ariosto. The 'Arcadia' of Sannazaro holds the first rank among the bucolics, written in alternate prose and verse in a vigorous, correct, but constrained style. The eclogues of Baldi are philosophical maxims versified. An important place in the literature is held by political writers, foremost among whom was Macchiavelli (1469-1527). A dramatist and historian of Florence, he is chiefly known as a profound and philosophical statesman by his discourses on Livy, his dialogues on the art of war, and especially by his 'Principe,' a manual of government, which was constantly in the hands of such sovereigns as Charles V. and Sixtus V., and the real intent and character of which has been long in dispute. His style is marked by simplicity, strength, thought, and a rare but felicitous use of ornament. Other political writings were the 'Ragione di stato' of Botero, and the 'Repubblica Fiorentina' of Giannotti. Nearer to Macchiavelli in merit was Paruta (1540-98), the author of 'Discorsi politici,' and of a treatise 'Della perfezione della vita civile.' The most renowned of Italian historians is Guicciardini (1482-1540), whose work embraces the period from 1494 to 1534. It is esteemed for impartiality and for its moral and political reflections, but is so diffuse and tedious that it is hard to read. Paolo Giovio wrote in Latin a partisan history of his own time. Historians of Florence were Nardi, Varchi, Nerli, Segni, Capponi, and Scip-

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ione Ammirato; the 'Storie Fiorentine' of the last includes the events from the foundation of the city to 1574. Historians of Venice were Bembo, Paruta, and Contarini; of Genoa, Giustiniani, Bonfadio, and Foglietta; of Ferrara, Cinzio and Falletti; and of Naples, Costanzo, Porzio ('La congiuro dei baroni,' etc.), and Summonte. General histories were written by Giambullari and Adriani. Davanzati translated Tacitus to prove the conciseness and energy of the Italian language, and made his version shorter than the original. He also wrote a history of the reformation in England. The splendor of the fine arts in this century gave occasion for historians of art, the principal of whom was Vasari (1512-74), whose lives of the most excellent painters, sculptors, and architects of Italy are written with naturalness and grace, and contain interesting notices of prominent Italian works of art. The autobiography of the Florentine goldsmith Benvenuto Cellini, one of the liveliest books in the literature, not only recounts his own fortunes, but gives curious notices of the courts of Rome, Florence, and France. He wrote also valuable treatises on jewelry and sculpture. Works on painting were written by Bernardino Campi of Cremona, Lomazzi of Milan, and Armenino of Faenza. Vignola and Palladio gained distinction as writers on architecture, and Marchi by a treatise on military architecture. Philosophy now began to assume an independence of the scholastic and ecclesiastical systems, and Girolamo Cardan and Giordano Bruno ventured upon the boldest speculations. The mathematics were cultivated by Tartaglia, Cardan, and others. The 'Institutione di tutta la vita dell'uomo' of Alessandro Piccolomini treats of education, marriage, the government of a family, and the chief end of man. The 'Cortigiano' of Castiglione has rare literary merits, making courtesy the theme of many learned and weighty reflections. Numerous novelists now flourished, among whom Bandello holds the first rank, his *novelle* being chiefly founded on real and common events. The novels of the monk Firenzuola and the 'Cene' of Lasca are both elegant and indelicate. Vettori and Salviati commented on the older poets, and the latter was engaged in compiling the 'Vocabolario della Crusca,' then the most important philological work in the language. All words not used by the great Forentine authors were excluded from it; even Tasso was not admitted as an authority. In the 17th century the natural sciences especially flourished. Under able patrons, the principal of whom was Duke Ferdinand of Tuscany, the Italian universities attained unprecedented celebrity. Scientific academies were founded in Rome, Florence, Bologna, and Naples; the Florentine *accademia del cimento* embraced the most illustrious savants of the time, and published important accounts of its researches. Preeminent among philosophers was Galileo (1564-1642), who was denounced as an innovator, and maintained the Copernican system only at his peril. His 'Diagnosi' and other works are written with elegance, his style and taste having been formed by reading Ariosto. His most noted pupils were Viviani, Torricelli, and Castelli, and contemporary physicists were Borelli, Malpighi, Bellini, and Francesco Redi. The learned and philosophical jurisconsult Vincenzo Gravina at-

tracted scholars from all parts of Europe to his lectures in Rome on public law, contained in his 'L'origine de diritto civile,' and other publications. The greatest historians were Sarpi, Davila, Bentivoglio, and Pallavicini. Sarpi (died in 1623), the defender of the republic of Venice in its contest with the Holy See, wrote an anti-papal and spirited history of the Council of Trent, which was replied to by Pallavicini in a work on the same subject. Davila, after 16 years' residence in France, narrated the civil wars of that country in a work esteemed for its truthfulness, and in respect of style one of the best Italian histories. Bentivoglio, the papal nuncio in Flanders, wrote of the Flemish wars of his time, many of the heroes of which he knew personally. Baldinucci, Dati, and Scamozzi were historians of the fine arts, and Cinelli and Boccalini of literature, while Bianchi treated important historical problems as to migrations, colonics, voyages, and the origin of monarchies and republics. Montecucculi, the military antagonist of Turenne, acquired distinction as an author by his aphorisms on the art of war. The Jesuit Bartoli wrote the history of his Society, and the sermons of the Jesuit Segneri were unrivaled in eloquence. The first Italian literary journal, the 'Giornale de' letterati,' was established in Rome in 1668. A want of naturalness and truthfulness marked the poetry of the age. External delineations, trifling details, conceits, and plays upon words were the leading objects of the poets. At their head was Marini of Naples (died in 1625), who was admired not only in Italy but in France and Spain, and originated the poetical school of the Marinists, by which only his faults were imitated. Among his contemporaries and successors were Chiabrera, Guidi, Tassoni, and Marchetti. The foundation of the academy of Arcadians in Rome in 1690 by Crescimbini and Gravina introduced an affectation of pastoral sentiments and habits in place of Marinism. Menzini, Zappi, Maggi, De Lemene, Salvator Rosa, and Bracciolini wrote satirical, erotic, and facetious verses. Throughout the 17th and 18th centuries the opera was the favorite Italian exhibition. It had long been produced with theatrical and musical splendor, when Zeni of Venice (died in 1750), and especially Metastasio (died in 1782), wrote operatic plays having remarkable poetical merits. When near the beginning of the 18th century the war of the Spanish Succession raged in Italy, and the kingdom of Naples fell beneath the sceptre of the infante Don Carlos, and afterward of Ferdinand III., literature and the sciences were cultivated with renewed vigor. Naples produced Giannone, distinguished in the department of history, Capasso in literature, Cirillo in medicine, Mazochi in archaeology, Genovesi in political economy, one Gagliani in architecture, and another in domestic economy and philology. Filangieri rivaled Montesquieu in the philosophy of legislation; Pagano wrote on the criminal law; Poli distinguished himself in the positive sciences; Maffei and Calsabigi devoted themselves to poetry. The university of Bologna was now in its splendor, its academy of sciences taking the name of "The Institute." Marsigli, Stratico, Cesaretti, Foscarini, the brothers Gozzi, Morelli, Maffei, Pompei, Lorenzi, Mazzuchelli, and Serassi made the city of Venice illustrious; but political jealousy prevented the culture of the

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economical and legislative sciences there, which under Beccaria and others were making great progress in other parts of Italy. In Tuscany, the famous French Encyclopædia was republished. In the cities of Lombardy flourished Scopoli, Fontana, Frank, Tissot, Spallanzani, Bertola, Villa, Natali, Volta, Scarpa, Tamburini, Parini, Beccaria, Verri, Landriani, Agnesi, Carli, and others devoted to literature, art, science, and the development of political and ethical principles. Bodoni raised the art of typography to an admirable elegance. Prominent among the patrons of literature was Victor Amadeus II. of Savoy. The Italian drama had as yet attained to excellence only in the opera, and lacked superior tragedies and comedies. It received an impulse in the 17th century from the French theatre, Martelli of Bologna (died in 1727) being the first who attempted to naturalize not only the French tragedy but the Alexandrine verse. The 'Merope' of Maffei was the best tragedy produced in the early part of the century. A greater influence was exerted upon his age and upon literature by Alfieri (1749-1803), the head of an important school of tragedy. He was the poet of energetic action and profound thought and feeling, as Metastasio was of love. Abandoning the customs of the court of Louis XIV, he revived the simple sublimity of the Greek stage, which had been the object of his favorite studies, and which was removed alike from French effeminacy and Spanish extravagance. A reformation in the Italian comedy was meantime effected by Goldoni (1707-93), the only genuine comic poet that Italy can boast, who sought in imitation of Molière to substitute for the *commedia dell' arte* a natural comedy of manners. In his efforts to give to the stage a more human and real character by ridding it of the traditional masks of the harlequin, pantaloon, and other stock characters, he had to contend especially against Chiari and Carlo Gozzi. The example of Kotzebue and Iffland gave rise to a lachrymose school of dramatic composition, maintained by Avelloni, Gualzetti, Greppi, and especially by Federici. The most illustrious historians were Muratori (died in 1750), Maffei, Denina, Mazzucchelli, Tiraboschi, and Lanzi (died in 1810). The 'Annali d'Italia,' 'Verona illustrata,' 'Revoluzioni d'Italia,' 'Scrittori d'Italia,' 'Storia della letteratura d'Italia,' and the 'Storia pittorica d'Italia' were respectively their best works. The writings of Muratori and Tiraboschi still maintain their reputation both for erudition and criticism. In archaeology, the names of Fabretti, Gori, Mazzocchi, Martorelli, Passeri, and Carli were distinguished. Campanella continued the philosophical movement of Bruno in opposition to scholasticism, and Vico (1690-1744) founded the new science of the philosophy of history. His 'Scienza nuova' is a view of general history, founded on the idea of Divine Providence and the essential elements of the common nature of man. Algarotti, Bettinelli, Buonafede, Vantetti, Tartarotti, and Alessandro Verri also added to the glory of the literature by abandoning the pedantic style that had been in vogue and introducing an acquaintance with foreign ideas and productions. Baretti contributed to the revival of good taste by ridiculing the Arcadians. Parini (1720-99) excelled in satirical poetry, his 'Giorno' being as remarkable for elegance

as for severity upon the effeminate life of the wealthy Milanese nobles. Among the works of Cesaretti was a translation of Ossian, esteemed in many respects among the happiest productions in the language, and which Alfieri confessed had been of service to him in the composition of his tragedies. The political and military movements in Europe of the last decade of the 18th century occasioned a regeneration not only of the literature but of the national spirit of the Italians. The early part of the 19th century rivals the age of Leo X., presenting Canova, Longhi, Cicognara, Appiani, and Beltrami in the fine arts; Monti, Foscolo, Pindemonte (partially contemporary with whom was Alfieri) in literature; and Volta, Melchiorre Gioja, Romagnosi, Scarpa, Spallanzani, and Oriani in the sciences. The author who doubtless exerted the greatest influence on the regeneration of poetry was Vincenzo Monti (1754-1828), who in the contest between the classic and the romantic tendencies favored the former, and in the contest between the Gallicists, or imitators of the French literature and idioms, and the Purists, who made Petrarch, Dante, and the other old Italian masters their models, sided with the latter. His poems, as 'Basilliana' and 'Feroniade,' his tragedies, as 'Galeotto Manfredi,' his elegy 'Mascheroniana,' the 'Proposta,' in which he disputed the restrictions which the Della Cruscani had fastened upon the language, and his translation of the 'Iliad' alike display an admirable and nervous style. Pindemonte also made a light and graceful version of the 'Odyssey,' and in his original poems especially lamented the desolation of his country. Ugo Foscolo (1777-1827) belongs to the school of Alfieri. His 'Ultime lettere di Jacopo Ortis,' a political and passionate romance in imitation of Goethe's 'Werther,' is supposed to describe his own troubled life. He wrote the lyric 'I sepolcri,' and other works in prose and verse, remarkable both for power and beauty. Mezzanotte celebrated in verse the struggle of the modern Greeks for liberty, regarding it not only as a political but as a religious conflict between Christianity and Islamism. The lyrical poems of Leopardi are highly esteemed. Among the epic and didactic poets were Botta, Ricci, Bagnoli, Arici, Grossi, Sestini, Pananti, and Lorenzi. Antonio Cesari (died in 1828) was the chief of the Trecentists, a school which carried its love of the Italian authors of the 14th century to affectation. Stratton published a dictionary containing only the words used by the Marinist authors. Mameli had exhibited the greatest promise in his ode to Venice, before he fell in the conflict at Rome in 1848-9. Prati, Aleardi, and the versatile priest, dramatist and journalist, Dall' Ongaro, were among the best lyric poets of Italy of the last half-century, and among contemporary lyric poets are Graf and Ada Negri. For the revival of pure and unaffected writing Italy was much indebted to the example of Carlo Botta, called by his countrymen the modern Thucydides. He wrote histories of the war of American independence and of Italy during the last three centuries. Vacani was a historian of the Peninsular war. Pietro Colletta wrote the history of Naples from its conquest by Charles III. of Spain in 1734. Amari wrote the history of the Arabs in Sicily and of the Sicilian Vespers, illustrating obscure periods in an age of national

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glory. Both were reflective or philosophical historians. Cesare Cantu wrote an immense universal history, a work of critical and artistic merit, which has been translated into several languages. He has also written novels, poems, critical essays, and other histories, one of the most important of which is 'La Storia di cento anni' (1851). Bianchi Giovini, a prominent and anti-Catholic journalist, wrote a history of the popes, a biography of Fra Paolo Sarpi, a history of the Hebrews, and a work on the supposititious Pope Joan. The political writings of Mazzini consist chiefly of articles in journals. Cesare Balbo wrote historical meditations, a life of Dante, and a summary of the history of Italy. Franscini wrote an accurate and authoritative statistical work on Switzerland (1847-51). La Farina is the author of a history of Italy from the most ancient to recent times; Federico Sclopis, of a history of Italian legislation (completed in 1857); Luigi Zeni, of an excellent compendium of Italian history; Romanin, of a learned history of Venice, written in opposition to that of Daru, and of a work on the Venetian inquisitors; Carlo Gemelli, of a history of the Belgian revolution of 1830; Giuseppe Rubini, of a history of Russia from 862 to 1725; Canette, of a history of Amadeus II. of Savoy; Canale, of a history of the Crimean war of 1854-5; Gallegna, of a history of Piedmont; Angelo Brofferio, of a history of Piedmont from 1814 to 1849, and of other works interesting from their patriotic spirit as well as literary merit; Anelli, of a history of Italy from 1814 to 1850; Carlo Catteneo, of a history of the insurrection at Milan in 1848 (he was a member of the committee that directed the operations against the Austrian militia, and a participant in the struggle); he also compiled the 'Archivio triennale,' an elaborate and most careful and valuable collection of authentic documents relative to the events that occurred in Italy from 1848 to 1850; Federico Torre, of a history of the French expedition to Rome in 1849; Ferrari, in a work on republican federation, treated the question under what form of government Italy ought to be reorganized; L. C. Farini wrote a history of the Papal States from 1814 to 1850; Gualterio, of the last Italian revolutions (1852); Vecchio, of the events in Italy in 1848-9; among more recent historians were Giudici (1812-72), Settembrini (1813-76), and De Sanctis (1818-83). A taste for illustrating the national antiquities also arose and Inghirami published 'Monumenti Etruschi,' Delfico his 'Origini Italiche,' Fanucci his 'Storia dei Veneziani,' 'Genovesi e Pisani,' Manno his 'Storia di Sardegna,' Bres 'Malta illustrata,' and Pompeo Litta his learned 'Famiglie celebri d'Italia,' containing interesting studies on every period of the national history. Visconti (1751-1818) was distinguished in classical archaeology, and Sestini was unrivaled in numismatics, making medals illustrate geographical questions. The natural sciences were advanced by four illustrious savants, who were nearly contemporary, Volta, Galvani, Scarpa, and Spallanzani. The discussions of Galvani and Volta concerning their new discoveries in electricity divided the scientific men of Europe into two factions, and the poets followed their example. Scarpa, a learned disciple of Morgagni, reduced anatomy to a positive science. Spallanzani wrote on physics and physiology in a style worthy of one

who declared philosophy itself imperfect unless its principles were elegantly expressed. Gioja and Romagnosi treated philosophical questions and the economical and political sciences, the 'Filosofia della statistica' being the principal work of the former, and the 'Genesi del diritto penale' of the latter. Manzoni produced new models of lyric verse, and examples of historical dramas and novels in his 'Adelchi,' 'Il conte di Carmagnola,' and 'I promessi sposi.' To the modified classical school of Monti belong the dramas of Silvio Pellico, chiefly known by his 'Francesco da Rimini' and 'Le mie prigioni,' and those of Nicolini, often founded on the history of his country, and strongly marked by patriotic feeling. The example of Sir Walter Scott in the production of historical romances had many followers in Italy. 'I promessi sposi' of Manzoni (1825) was succeeded by the 'Monaca di Monza,' 'Luisa Strozzi,' and 'Il conte Ugolino della Gerardesca' of Rosini; the 'Margherita Pusterla' of Cesare Cantu; the 'Marco Visconti' of Grossi; the 'Ettore Fieramosca' of Azeglio; and the 'Battaglia di Benvento,' 'Assedio di Firenze,' 'Isabella Orsini,' and 'Beatrice Cenci' of Guerrazzi. Italy received with enthusiasm these romantic delineations from her ancient history. The romance entitled 'Famiglia' (1850), by Bersezio, is one of the best late Italian novels. The 'Dr. Antonio' of Ruffini is esteemed for its pictures of Italian scenery. Accomplished women have taken a considerable part in recent Italian literature. The 'Morte di Adone' of Teresa Bandellini was followed by the learned philosophical and religious poems of Diodata Saluzzo, with which she intermingled slight lyrical pieces. Cecilia de Luna Foliero wrote on the education of girls and the moral influence of music. Giustina Rimier Michiel celebrated in song the festive days and commemorated events of Venice. Isabella Teotochi Albrizzi wrote a graceful and truthful biography of Canova. The work of the Signora Ferucci on the education of girls received the encomiums of Gioberti and other distinguished thinkers. Other female authors are Lucrezia Marinella, Sabina Rasori, Silvia Curtoni Verza, Costanza Moscheni, and Leonora Fonseca Pimentel. In philosophy, the names of Gioja and Romagnosi were succeeded by that of Pasquale Borelli (Lallebasche), the author of an introduction to philosophy, and of works on the nature and genesis of thought, in which he opposed the empiricism of Romagnosi. Pasquale Galuppi (1770-1846), in elaborate works, combated the philosophical tendencies of the 18th century by doctrines founded on the philosophy of the Fathers of the Church. He was a student of the German philosophers, and one of his most interesting works was on the changes of modern philosophy from Descartes to Kant. Mamiani (born in 1802) published his 'Rinnovamento dell' antica filosofia Italiana' with the design of restoring the philosophical method of the Church Fathers, which he regarded as the national philosophy of the Italians, and of reconciling the extreme conclusions of speculative philosophy with the dictates of common sense. Rosmini (1787-1855) and Gioberti (1801-52) developed ideal Catholic theories, and founded a school in which, according to Rosmini, the only necessary and innate idea is that of the possibility of being. Gioberti, a more brilliant and learned

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author, denounced psychology, and made the formula *L'ente crea le esistenze* the ontological basis of philosophy. Among contemporary literary celebrities are Annunzio, poet, dramatist and novelist; Carducci and Rapisardi, poets and critics; Cossa, Ferrari, Giacometti, Pulle ("Castelnuovo"), dramatists; De Amicis, Barrili, E. Castelnuovo, Farina, Matilde Seras, and Verga, novelists. Among modern scientific authors and critics are D'Ancona, Ascoli, Comparetti, De Gubernatis, Lombroso, Rajna, and Villari.

Art.—For *Italian Architecture* see ARCHITECTURE.

Painting and Engraving.—The 12th century is generally taken as the period of the beginning of the history of painting in Italy, but before that time it had been the scene of the labors of Greek and Byzantine artists. During the pontificate of Leo the Great (440–461) a large picture in mosaic was executed in the Basilica of St. Paul, on the road to Ostia, and the portraits of the first 42 bishops, which are seen in the same church, date their origin from the same time. Mosaic and encaustic painting was then the prevalent mode. Painting in distemper was afterward introduced. About the end of the 6th century there were many paintings which were not believed to be the work of mortal hands, but were attributed to angels or blessed spirits. To this class, called *Acheiropoietia* (not made with hands) belongs one of the most famous representations of the Savior, in wood, at Rome, of which a sight can be obtained only with difficulty, in the *sanctum sanctorum*. In the 8th century painting on glass, mosaic on a ground of gold, and painting in enamel, were zealously prosecuted in Italy. There were already many native artists. One of the oldest monuments of art is the celebrated Christ on the Cross, in the Trinity church at Florence, which existed there as early as 1003. About 1200 a Greek artist, Theophanes, founded a school of painting in Venice. The art was first pursued with zeal in Pisa. The only artist of eminence who preceded Cimabue, who was born at Florence in 1240, was Guido of Siena, whose most celebrated work is a madonna, executed in 1221 for the church of San Domenico in his native place, where it is still to be seen. Cimabue, who was regarded as a prodigy by his contemporaries, first introduced more correct proportions, and gave his figures more life and expression. His scholar Giotto (died 1336) excelled him even in these respects, and exhibited a grace hitherto unknown. He was the friend of Dante and Petrarch, and practised with equal success historical painting, mosaic, sculpture, architecture, and portrait and miniature painting. He first attempted foreshortening and a natural disposition of drapery, but his style nevertheless remained dry and stiff. Boniface VIII. invited him to Rome, where he painted the still celebrated Navicella. He was followed by Gaddi, Stefano, Maso, and Simone Martini (Memmi). But Masaccio (properly Tommaso Guidi, born 1402) first dispelled the darkness of the Middle Ages, and a brighter dawn illuminated the art. The Florentine Republic in the beginning of the 15th century had attained the summit of its splendor. Cosmo de' Medici patronized all the arts and sciences; Brunelleschi then built the dome of the cathedral; Lorenzo Ghiberti cast the famous doors of the baptistery in bronze;

and Donatello was to statuary what Masaccio was to painting. Paolo Uccelli laid the foundation for the study of perspective. Luca Signorelli, who first studied anatomy, and Domenico Ghirlandaio, who combined noble forms and expression with a knowledge of perspective, and abolished the excessive use of gilding, were distinguished in their profession. Leonardo da Vinci (1452–1519), who was a master in all the arts and sciences, infused so much philosophy and feeling into the art that, by his instrumentality, it quickly reached maturity. From him the Florentine school acquired that grave, contemplative, and almost melancholy character to which it originally leaned, and which it afterward united with the boldness and gigantic energy of Michelangelo. The Roman school already enumerated among its founders the miniature painter Oderigi, who died in 1300. He embellished manuscripts with small figures. Guido Palmerucci, Pietro Cavallini, and Gentile da Fabriano were his most distinguished successors. Almost all the painters of this time were accustomed to annex inscriptions to their pictures: the annunciation to the Virgin Mary was their favorite subject. Perugia was the principal seat of the Roman school. As early as the 13th century there was a society of painters there. Pietro Vanucci, called "Perugino" (1446–1524), first introduced more grace and nobler forms into this school, whose character acquired from him something intellectual, noble, simply pious, and natural, which always remained peculiar to the Roman school. Perugino's great scholar Raphael soon surpassed all former masters, and banished their poverty, stiffness, and dryness of style. Taste came into Venice from the East. Andrea Murano and Vittore Carpaccio are among the earliest artists of that city. Giovanni and Gentile Bellino are the most distinguished painters of the earlier Venetian school. The latter labored some time in Constantinople under the reign of Mohammed II. They introduced the glowing colors of the East; their style was simple and pure, without rising to the ideal. Andrea Mantegna (died 1506) was the first to study the ancient models. Padua was the principal seat of the Venetian school. Mantegna afterward transferred it to Mantua, and his style formed the transition to the Lombard school. Schools of painting flourished in Verona, Bassano, and Brescia. Giovanni da Udine (who was so distinguished by his faithful imitation of nature in secondary things that he painted for Raphael the garlands around his pictures in the Farnesina), Pellegrino, and Pordenone were the most able predecessors of the two great masters of the Venetian school, Giorgione and Titian. No capital city served as the central point of the Lombard school. Bologna subsequently became the centre. Imola, Conto, Ferrara, Modena, Reggio, Parma, Mantua, and Milan were afterward considered the seats of this school. Galasio (who lived about 1220), Alighieri, Alghisi, Cosimo Tura, Ercole Grandi, and especially Dosso Dossi (died 1560), were the principal painters of Ferrara. The last, a friend of Ariosto, possesses a remarkable grandeur of style, united with a richness of coloring which may bear comparison with that of Titian. Bramante (died 1514), who was likewise a great architect; Lippo Dalmasi; and especially Francesco Raibolini (died 1517), called "Francesco Francia," were

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highly distinguished among the Bolognese masters. Here also belongs the charming Innocenzo da Imola.

We now come to the greatest masters of any age, called "Cinquecentisti," from the century in which they flourished. After Leonardo da Vinci, in the Florentine school, had settled the proportions of figures, and the rules of perspective and of light and shade, and his scholars, Luini, Salaino, and Melzo, besides the admirable Baccio della Porta ("Fra Bartolommeo," d. 1517), Andrea del Sarto (d. 1530), the gifted Baldassare Peruzzi and the gay Razzi had made this school distinguished, there arose the most extraordinary of all masters, Michelangelo Buonarotti (1475-1564). His gigantic mind grasped, with equal power, statuary, architecture, and painting. His fire of composition, his knowledge of anatomy, the boldness of his attitudes and foreshortenings, leave him without a rival; but, as a model, he was detrimental to the art, because his imitators necessarily fell into exaggeration and contempt of a simple style. In grandeur his fresco painting, the 'Last Judgment,' in the Sistine chapel at Rome, is imimitable. Beauty was never so much his object as power and sublimity, especially since, in the former, he could never equal Raphael, but in the latter stood alone. Dante was his favorite poet. In his later years the erection of St. Peter's church almost entirely engrossed his thoughts. Rosso de' Rossi, Daniele da Volterra, Salviati, Angelo Bronzino, Alessandro Allori, and many others were his scholars and imitators. If we turn our attention to the Roman school we find at its head the first of artists, Raphael Sanzio da Urbino (1483-1520). His genius showed itself as elevated in his fresco paintings, in the *stanze* and *loggias* of the Vatican (the former of which contain the 'School of Athens,' the 'Par-nassus,' and the 'Conflagration of the Borgo,' while the latter contain Scriptural scenes from the creation through the whole Old Testament), as it appears lovely, spiritual, and original in the frescoes of the Farnesina (representing the life of Psyche). No less superior are his oil paintings, of which we shall only mention his madonnas, celebrated throughout the world, especially the 'Madonna del Sisto' (in the Dresden gallery), the 'Madonna della Sedia' (in Florence), 'Madonna della Pesce' (in Madrid), 'Maria Giardiniere' (in Paris), 'Madonna di Foligno' (in Rome), his 'St. Cecilia' (in Bologna), and his last work, the 'Transfiguration of Christ.' His scholars and successors—the bold Giulio Romano (d. 1546), the more gloomy Gianfrancesco Penni, called "il Fattore" (d. 1528), the lofty Bartolomeo Ramenghi, surnamed "Bagnacavallo," Pierino del Vaga (properly Buonaccorsi), Polidoro da Caravaggio, Gemignani, Benvenuto Tisio da Garofalo, and many others—were skilful masters; but they forsook the path of their great pattern, and degenerated into mannerism. Federico Baroccio (d. 1612) endeavored to counteract this tendency. In spirit he belonged to the Lombard school, as he aimed at, and in part attained, the grace of Correggio. With his scholars Francesco Vanni and the brothers Zuccheri he infused a new life into the Roman school, though the latter produced pleasing rather than great works, and fell into mannerism. Muziano was distinguished in landscape-painting, and Nogari and Facchetti in portrait-painting. At the head of the Vene-

tian school we find the two excellent colorists Giorgione Barbarelli di Castelfranco (d. 1511) and Tiziano Vecelli (d. 1576). The portraits of the former are celebrated for their warmth and truth. The latter was great in all the departments of art, inimitable in his carnation, or painting of flesh tints, excellent as an historical and portrait painter, and the first great landscape-painter. Even in extreme old age his powers were unimpaired. Ariosto and Aretino were friends of the gay, happy Titian. Some of his most famous works are the altar-piece of St. Pietro Martire, his pictures of 'Venus,' his 'Bacchanal,' and his 'Children Playing,' in Madrid, his 'Cristo della Moneta,' etc. He first understood the art of painting with transparent colors. In groups, he selected the form of a bunch of grapes for a model. His successors—Sebastiano del Piombo, Palma Vecchio, Lorenzo Lotto, Paris Bordone, Pordenone—are distinguished especially in coloring. Schiavone, whose *chiaroscuro* and richness of color are truly remarkable; Giacomo da Ponto, called "Bassano," who imitated reality, even in common things, to deception, and who was the head of a whole family of painters; the ardent, inspired Robusti, called "Il Tintoretto" (d. 1594), and the fantastic, splendid Paul Veronese, properly Paolo Cagliari (d. 1588), who painted boldly and brilliantly with a free pencil, but neglected all propriety of costume, and frequently mingled masks in historical paintings, were ornaments of the Venetian school. It likewise degenerated, and its mannerists were worse than those of the other schools, because they did not study the antiques and the ideal. At the head of the Lombard school we find the charming Antonio Allegri da Correggio (d. 1534), whose works are distinguished for harmony of colors as well as for expression and grace. His successors and scholars were Francesco Rondani, Gatti, Lelio Orsi, and especially Francesco Mazzola, called "Il Parmigianino" (d. 1540). This artist possessed much ease, fire, and a peculiar grace, which frequently borders on mannerism. Gaudenzio Ferrari and many others are the ornaments of the Milanese school. In Bologna we find Bagnacavallo (d. 1542), a distinguished artist of this period, whom we have already mentioned as one of Raphael's scholars. Francesco Primaticcio (d. 1570), Niccolò dell' Abbate, Pellegrino Tibaldi, Pasarotti, and Fontana were also celebrated Bolognese artists.

They were followed by the three Carracci, who endeavored to restore a pure style, and, by the combined study of the ancient masters of nature and science, to give a new splendor to the degraded art. Their influence was powerful, and Italian art became divided between the followers of the Carracci, who were called eclectics, and the followers of Michelangelo da Caravaggio, called naturalists. Lodovico Carracci (1555-1619) was, according to some accounts, the uncle, according to others the cousin of the two brothers Agostino (1558-1601) and Annibale (1560-1609). In 1589 all three united in establishing at Bologna an academy for painting, which was called *accademia degli incamminati*, and soon became so famous that all other schools for painting in the city were closed from want of attendance. The scholars of the Carracci are numberless. The most famous endeavored to unite the grace of

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Correggio with the grandeur of the Roman masters. Cesare Aretusi was distinguished for the most faithful copies of Correggio and Guido Reni (d. 1642), especially for the ideal beauty of his heads, the loveliness of his infant figures and the uncommon facility of his pencil. The Bolognese Francesco Albani (d. 1660) lived in constant rivalry with Guido. He produced many large church paintings, but was most celebrated for the indescribable charm with which he represented, on a smaller scale, lovely subjects from mythology, and especially groups of Cupids. His paintings in the Verospi gallery, and his 'Four Elements,' which he painted for the Borghese family, gained him universal reputation. The background of his landscapes is excellent. All his works breathe serenity, pleasure, and grace. The third great contemporary of those already mentioned, Domenico Zampieri, called "Domenichino" (d. 1641), was at first little esteemed by them, on account of his great modesty and timidity. Thrice were prizes awarded by Lodovico to drawings, the author of which no one could discover. At last Agostino made inquiries, and the young Domenichino timidly confessed that the drawings were his. His industry and perseverance rendered him the favorite of his master. His works evince the most thorough knowledge, and are rich in expression of character, in force, and truth. His 'Communion of St. Jerome,' his 'Martyrdom of St. Agnes,' and his fresco in the Grotta Ferrata, are immortal masterpieces. Giovanni Lanfranco (d. 1647) was especially distinguished for the effect of his light Bartol. Schidone is one of the best colorists of this school. The Bibienas, the Molas, Al. Tierini, Pietro da Cortona, Ciro Ferri, also deserve mention. At the head of the naturalists, who, with a bold and often rash pencil, imitated nature, without selection, stands Michelangelo Merighi, or Amerighi da Caravaggio (d. 1609). The chief of those who in a later age took him as a model was Salvator Rosa (d. 1673), to whose name may be added those of Preti "il Calabrese" and Giuseppe Crespi, called "Spagnuolo." His chief opponent in Rome was D'Arpino, who stood at the head of the idealists, or rather of the mannerists. Caravaggio and his successors, Manfredi, Leonello Spada, Guercino da Cento, etc., often took common nature for a model, which they servilely imitated, thus profaning the genuine dignity of the art, though they cannot be denied strength and genius. About this time, the beginning of the 17th century, the *bambocciate* were introduced. (See LAAR, PETER.) Many artists, especially Michelangelo Crequozzi, surnamed "delle battaglie" and "delle bambocciate," followed this degenerate taste. Andrea Sacchi made great efforts to oppose him. His drawing was correct and grand; Raphael was his model.

Italian art, already in the 17th century very far sunk below the purity of style and the nobility of composition which distinguished it in the time of Raphael, during the 18th century fell into a complete decay. Three or four names of this epoch, those of the Neapolitan Solimena, the Venetians Tiepolo and Canaletto, and the Lucchese Pompeo Battoni, alone deserve to be saved from oblivion. During the first half of the 19th century the artists of Italy still confined themselves to dull imitations of the ancient masters and to academical commonplaces. The

Milanese Andrea Appiani is the only one that need be separately distinguished among the crowd. The other more tolerable painters of this period are Francesco Hayez, Vincenzo Camuccini, Pietro Benvenuti, and Giuseppe Bezzuoli. At the present day an improvement is discernible in the position of Italian art, and serious efforts are being made to rise above the standard of academic conventionality. Among the chief artists are Ussi of Florence, Andrea Gastaldi of Turin, Federigo Faruffini of Sesto, Domenico Morelli, Francesco Castiglione, Camillo Miola, and others belonging to Naples, Pompeo Molmenti of Venice, etc.

In the art of engraving the Italians acquired great eminence. Tommaso Finiguerra, who flourished 1460, was the first celebrated master of this art, which he taught to Baccio Bandini. They were succeeded by Mantegna; but Marco Antonio Raimondi, of Bologna, who lived in 1500, was the first to introduce greater freedom into his engravings. His copies of Raphael have always been highly valued, on account of their correctness. His manner was imitated by Bonasone, Marco da Ravenna, Ghisi, and others. Agostino Carracci, Parmegiano, Carlo Maratti, and Pietro Testa etched some excellent works. Stefano della Bella was distinguished for his small, spirited, and elegant pieces. Among the moderns, Bartolozzi deserves mention in stippled engraving. Cunego, Volpati, and Bettolini are also distinguished; but, above all, Giuseppe Longhi (d. 1831) and the Florentine Raphael Morghen (d. 1833), who carried the art of engraving to a degree of perfection never before anticipated. Among the most celebrated Italian engravers subsequent to these two are Faustino, Pietro Anderloni, Domenico Marchetti, L. Calamatta, Giuseppe Bianchi, Pietro Fontane, Cremonesi, Michele Bisi, Filippo Caporali, Locatelli, and Faruffini.

Sculpture.—Although Italy has possessed some eminent sculptors, this branch of art (apart from some great works of Michelangelo) never attained so high a position in that country as painting. Nothing need be said of the sculptures which decorate the monuments erected during the Romano-Byzantine period of Italian art. For the most part they merely reproduce conventional types, and they are uniformly very roughly executed. To Niccolò da Pisa in the 13th century belongs the honor of having first broken loose from the barbarous manner of the early carvers in stone, and to have taken as models the masterpieces of ancient art. His numerous works (among others the pulpit in the baptistery of Pisa and the tomb of Saint Dominic at Bologna) clearly reveal the new source of inspiration. Niccolò had a worthy successor in his son (according to other accounts brother), Giovanni da Pisa, who in his turn trained up a school of sculptors in the true principles of the art. The most famous of these are the brothers Agnolo and Agostino da Siena and Andrea da Pisa. The influence of Giovanni da Pisa may also be traced in the magnificent works of Masuccio, Pietro, Stefanoni, and others, all of whom were distinguished in architecture as well as in sculpture, for it must not be forgotten that at that time, and even as late as the 15th century, sculpture and even painting were rather regarded as handmaids of architecture, than as separate arts regulated by laws of their own. Hence it was necessary for the archi-

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tect to possess a thorough knowledge of all the three arts, and thus we find that several masters, such as Giotto, Andrea, Orcagna, Leonardo da Vinci, Michelangelo, and Raphael were at once architects, painters, and sculptors, that others were architects and painters, and still more architects and sculptors. During the 15th century the sculptors of Florence, then the metropolis of the arts, excelled all their rivals, as much as her painters and architects did theirs. At their head stand Lorenzo Ghiberti (d. 1455), and Donatello (d. 1466), both of whom instead of contenting themselves with a mere imitation of the works of antiquity, only looked to them for lessons as to the manner in which nature was to be understood and interpreted, while in other respects they followed an independent path. Among the other great artists of the period were Filippo Brunelleschi, Giacomo della Quercia, and Niccolò d'Arezzo, all of whom besides Donatello were competitors with Ghiberti in the case of the famous bronze doors of the baptistery of the church of San Giovanni at Florence. (See *GIBERTI*.) Giacomo della Quercia afterwards rendered himself celebrated by executing the central door of the cathedral of Bologna. Brunelleschi was so much devoted to architecture that he has left behind him but a small number of sculptures. Luca della Robbia was also eminent among the masters of that time, but his works are chiefly in enameled earthenware, the secret of making which he discovered. The best pupils of Donatello were Desiderio da Settignano (d. 1485), and Andrea Verrochio, a jeweler, sculptor, engraver, painter, and musician, celebrated as the sculptor of one of the most admirable equestrian statues in bronze anywhere to be seen, that of Colleone at Venice, and no less so as the teacher of Leonardo da Vinci and Michelangelo. The other chief sculptors of the 15th century are Matteo Civitali, Benedetto da Rovezzano, and Lorenzo di Pietro (called "Il Vecchietta"), the last also celebrated as a painter and an architect. In Michelangelo the Italian renaissance in statuary reached its highest point. That great artist gave to the human form a character of force and majesty, and in action a fulness and vehemence which he did not always keep within the limits of reality, but which constitute the sublime and truly original aspect of his works. His great misfortune was to be followed by a crowd of imitators, who exaggerated the majesty of his style to a ridiculous extreme. The two most illustrious of his pupils were Montorsoli and Baccio da Montelupo. Sansovino (d. 1570) was able to preserve himself from a servile imitation, and became the founder of a school at Venice, from which proceeded Cattaneo, Pietro da Salo, Jacopo Colonna, and others. Besides these the 16th century numbers among its celebrated masters of the chisel Benvenuto Cellini, more famous as a designer in metal than as a sculptor in marble, Tribolo, Vincenzio Danti, Giovanni Merliano da Nola, called the Michelangelo of Naples, etc. With Bernini in the 17th century statuary underwent a complete decline similar to that which befell the other arts as well as literature during the same period, from which condition it did not rise again till about the end of the 18th and the beginning of the 19th century, when a renewed lustre was shed on the Italian school of sculpture by Antonio Canova (d. 1822), who acquired an immense reputation,

partly justified by the grace of his figures and the delicacy of the execution. After him Lorenzo Bartolini (d. 1850) acquired distinction by the excellence of his works. The chief defect of this artist and of the Italian sculptors of the present age generally is the want of originality of conception and breadth of execution.

Music.—In Italy the imperfect forms of ancient music were first lost in the modern. Here we first find the proper choral song, the foundation of modern church music, which was at first sung in unison, chiefly in melodies derived from the old Graeco-Roman music, and adapted to Christian hymns and psalms. (See *MUSIC*.) It seems to have had its origin when Bishop Ambrosius, in the 4th century, introduced into the Western Church songs and hymns adapted to the four authentic modes of the Greeks, and appointed psalmists or precentors. Gregory the Great, in the 6th century, enlarged the choral song by the plagal modes. From this time singing-schools were multiplied, and much was written upon music. The most important inventions for the improvement of music generally we owe to the 11th century, and particularly to the Benedictine Guido of Arezzo, who, if he did not invent the mode of writing musical notes and the use of the clef, improved and developed them, determined the exact relations of the tones, named six of the tones of the scale, and divided the scale into hexachords. In the 13th century the invention of music in measure was spread in Italy, dependent upon which was that of counterpoint and figured music. Instruments were multiplied and improved in the 14th and 15th centuries. Many popes favored music, particularly vocal, and consecrated it by their briefs; yet the ecclesiastical ordinances restrained the independent development of music. Much instruction was given in singing in the 15th century, and not entirely by monks. Music acquired the rank of a science, and vocal music in counterpoint was developed. In the 16th century we discover distinguished composers and musicians—Palestrina (chapel-master to Pope Julius III.), whose works possess great dignity and scientific modulation; his successor, Felice Anerio; the celebrated contrapuntist and singer, Gregorio Allegri; and the writer upon harmony, Giuseppe Zarlino, chapel-master at Venice. Music was cultivated at Rome and Venice with the greatest zeal. Hence it spread to Naples and Genoa; and all Italy, Schubert says, was soon a loud-sounding concert-hall, to which all Europe resorted to hear genuine music, particularly beautiful singing. About the end of the 16th century we first meet with the opera. The first operatic composer was Jacopo Peri. The taste for this new kind of composition spread so quickly, that composers were soon unable to supply the demands of the people, and from 40 to 50 new operas appeared yearly in Italy. This caused great competition among the Italian musicians. Thus the peculiar character of the Italian music, not to be changed by foreign influence, was developed the more quickly, because this species was cultivated independently, and unrestrained by the church. Already, in the middle of the 17th century, when the music of the theatre was continually advancing, simplicity began to give place to pomp and luxuriance, and the church style to decline. Music (says Schubert) united the profane air of the drama with the fervor of the church style, and

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this was the first cause of the decline of the latter. Let us now consider the principal periods of the former. Vocal music must have been first; it was regulated by the discovery and improvement of instruments; thence arose the simple, grand church music of the 15th and 16th centuries; with it various forms of national song were developed. On the stage the higher style of music flourished independently. Here the Italian, without much attention to the poetical part of the performance, which was, as a rule, only the hasty work of a moment, though an exception must be made in favor of the operatic texts of Metastasio, followed his inclination for melody and sweet sounds, which appears even in his language. All the southern nations show a great sensibility, and melody is to them as necessary as harmony to the inhabitants of the north; but to no nation so much as to the Italians, whose beautiful climate and happy organization for song (Italy produces the most beautiful alto and tenor voices—few bass) made melody their chief aim in their music. On the other hand, the simplicity of melody degenerated into effeminacy and luxuriance, from the time when vocal music developed itself independently, and the voice, but little supported by the instrumental music, began to be cultivated like an instrument; when, instead of poetical expression and truth, mere gratification of the ears, not deep emotion, but a momentary excitement, and a rapid change of tones, with the avoidance of all dissonance, were principally desired; when music began to predominate over poetry, which first took place on the stage and thus the musical part of the performance obstructed the improvement of the dramatic and poetic. This taste spread over other countries so much the more easily as Italian music had advanced by rapid strides far before that of the rest of Europe, as appears even from the predominance of Italian terms in the language of music. Among the best composers of the 17th century are Girolamo Frescobaldi, Francesco Foggia, Bapt. Lully, and the celebrated violinist and composer Arcangelo Corelli. To the singers, of whom the most were also composers, belong Antimo Liberati, Matteo Simonelli, both singers in the chapel of the Pope. In the beginning of the 18th century Ant. Caldara was distinguished. He increased the effect of the singing by the addition of instruments, but his style partook much of the theatrical. In the middle of this century Italian music, especially theatrical, flourished, particularly at Naples, Lisbon, and also in Berlin. This has been declared by some the most brilliant period of Italian music. There were some distinguished instrumentalists in Italy, as the organists Scarlatti and Martinelli, the violinist Tartini, Domenico Ferrari, Geminiani, Ant. Lolli, Nardini, and Clementi. Among the composers of the 18th century may be mentioned Traetta, who, through his refinements, injured the simplicity of composition; Galuppi, distinguished by simple and pleasing song, rich invention, and good harmony; Niccolo Jomelli, who gave greater importance to instrumental music; Nic. Porpora, distinguished for his *solfeggios* in church music; Pergolesi, whose music is always delightful from its simple beauty (for example, his *Stabat Mater*); Pater Martini, at Bologna; the sweet Piccini, rival of Gluck; the agreeable Sacchini Sarti. Of a later date are Paesiello, Cimarosa, the ornament of

the *opera buffa*, and Zingarelli (Romeo and Juliet), Nasolini, Paganini, Niccolini, Cherubini, Rossini, Bellini, Donizetti, Verdi, Mascagni, and Perosi.

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Italy, Free Church in, a reformed religious sect founded by Alessandro Gavazzi in 1870 (see **GAVAZZI, ALESSANDRO**). In 1874 a confession of faith was formulated, an ecclesiastical constitution framed under a General Assembly; and the title of “Free Church in Italy” assumed. The confession scarcely does more than echo those of the Protestant Churches, and the constitution is based on the government by elders, like that of the Presbyterians, though the several congregations are practically uncentralized, as with the Independents. In 1891 by royal decree, the title “Chiesa Evangelica Italiana” was given to this body. The English sympathizers of Gavazzi bought and presented to the Free Church in Italy the old Church of San Jacopo in Florence, which city is the headquarters of the sect, and the meeting place of the General Assembly, and the present seat of the theological seminary which was originally established at Rome (1875), but transferred in 1891. Gavazzi, a remarkably eloquent man, was appointed professor of dogmatics, apologetics and polemics, as well as of pulpit oratory, a position he held till his death. The schools of the church in Florence are partially supported by the state. According to statistics for 1901 the General Assembly legislates for 30 congregations represented in it, of which there are 14 ordained ministers and 1,831 communicants.

Itasca Lake, farthest source of the Mississippi, in northern Minnesota. (The name is declared by Rev. W. T. Boutwell, a companion of H. R. Schoolcraft in his exploration, to have been barbarously formed in his presence from syllables of Latin *veritas*, truth and *caput*, head, as the “true head” of the Mississippi; but on Schoolcraft’s first map it appears as Itasco, a neighboring stream being named Itasca, and Schoolcraft was a college-bred man hardly capable of such a solecism.) An extremely irregular body of water occupying a glacier-made bowl-shaped depression, surrounded by heights covered with dense forests, interspersed on the slopes with streams, springs, and small lakes often with no apparent outlet. The ground has a substratum of sand and gravel, mingled with large boulders; the surface is spongy and swampy. This basin has been made a national

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park of about 7 by 5 miles, containing 19,701.69 acres (30.78 square miles). In the centre, fed by sources so permanent and with a flood plain so small that it has actually risen in dry seasons (though it receded some feet during the 19th century), lies Itasca, a giant among the small ponds around it, but having an area of only 1,130 acres, or $\frac{1}{3}$ square miles. It is composed of a centre running east and west about a mile, whence extend north and south an east and a west arm about $1\frac{1}{2}$ miles long each, and another northward about a mile, the width varying from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile. It has a shore line of 23,000 yards (over 13 miles). Depth, 4 to 50 and 60 feet; average, 20 to 35. The Mississippi flows from its north arm; a strong brook called by Nicollet the "Infant Mississippi" flows into the west arm. See MISSISSIPPI RIVER.

Itata Case, 1891, an important international imbroglio, resulting from the *coup d'état* of Balmaceda (q.v.) and the revolt of the constitutional party in Chile. The latter through an agent had bought a quantity of arms and ammunition in New York, which were shipped to San Francisco and then sent by a schooner to the southern coast, where it was met by the insurgents' vessel, the Itata, and the cargo transferred. The vessel had a few soldiers and a little artillery on board. The attorney-general issued a writ of detention on the ground that she was violating our neutrality laws; and this failing, our cruiser Charleston was sent in pursuit, overhauled and captured her, and placed her on trial before the United States district court at San Diego. The courts discharged her as not having been guilty of such violation. The real interest of the case was political. It was notorious that our government and many of its civil and naval representatives sympathized with Balmaceda against the insurgents, and it was charged with going out of its way in order to cripple the latter; while the other party were ready to make war on the Chilean constitutionalists for defying our authority.

Itch, a contagious disease of the skin (scabies) due to its invasion by the itch-mite (*Sarcoptes scabiei*), now rather rare in civilization. Even the adult mite is so small as to be barely visible, the female being about one sixteenth of an inch long and not quite as wide, while the male is still smaller. It has eight legs, two on each side of the head, to which suckers are attached, and four behind. (See MITE.) The female burrows into the skin and deposits her eggs, about 50 in number, and dies after a period of six weeks. After the eggs hatch out, the young make their way to the surface, and the impregnated females again burrow into the skin, so keeping up the process. The most frequent sites selected by the bugs for their burrows are the web between the fingers, the front of the wrists, the umbilicus, the genitals in men, and the under side of the breasts in women. The first sign of the disease is itching, which forces the patient to scratch, particularly at night, as the warmth of the bed increases the itch. The skin soon becomes inflamed from scratching, and the discomfort is increased. Close examination may show the tiny burrow like a reddened pin-scratch about half an inch long. Many remedies are used with success, but sulphur in the form of an

ointment is the most common. As the bugs cannot be killed while still in the skin, a good plan is to take a hot bath with brisk rubbing, apply the ointment night and morning for three days, continuing to wear the same clothing and sleep in the same bed-clothes; at the end of that time another bath is to be taken, all clothing and bed-clothes changed, and another series of rubbings started. This must be continued as long as fresh burrows are found. Great care must be taken in washing the clothing of an affected person, thorough boiling or baking being necessary to kill the mites. Transmission from one individual to another on close contact is readily effected.

Itch due to varieties of this mite affects all the domestic animals and some wild ones, as the lion, wolf, wombat, etc.; and in Europe, where it occurs more often than in America, epidemics of it sometimes run their course through the dogs, cats, horses, etc., of a town or district, often causing the death of the smaller animals. An application of sulphur ointment is recommended. The itch-mite of fowls is a different species.

Ithaca, Mich., village and county-seat of Gratiot County, on the Ann Arbor railroad, 40 miles northeast of Lansing. It has a courthouse erected at a cost of \$75,000, high school and other public buildings; and manufactures of flour, lumber, wind-mills and agricultural machinery, and several large potteries and iron works. It is the centre of an important agricultural district. Pop. (1890) 1,627; (1900) 2,020.

Ithaca, N. Y., city and county-seat of Tompkins County, on Cayuga Lake, and on the Lackawanna and the Lehigh Valley R.R.'s; 70 miles southeast of Rochester. It derives water power from Fall Creek and has manufactories of autophones, glass, typewriters, drop forgings, calendar clocks, firearms, salt, wall paper, agricultural implements, iron castings, machinery, etc. The city is best known as the seat of Cornell University (q.v.) and the Cascadilla Preparatory School; and also as a popular summer resort. There are two national banks, trolley connection with East Ithaca, large farming trade with Tompkins, Tioga, Cortland, and Seneca counties; and an assessed property valuation exceeding \$7,000,000. In the immediate vicinity are numerous gorges and waterfalls, the most noted of the falls being Triphammer, Ithaca, Taughannock, and Buttermilk. The Taughannock is 215 feet in height and is the highest waterfall east of the Rocky Mountains. There is here the Cornell Free Library containing 21,000 volumes, the Ithaca Conservatory of Music and Renwick Park. Under the charter of 1888, the government is vested in a mayor and city council elected every two years. Ithaca was first settled in 1787 and was called at different periods, "Sodom," "The Flats," and "the city," until 1806, when Simeon Dewitt gave it the name it bears. It was incorporated as a village in 1821. Pop. (1890) 11,097; (1900) 13,136.

Ito, Hirobumi, hē-rō-boō'mē ē'tō, Marquis, Japanese statesman: b. in Choshū province, 1840. When the officer of the deck of the United States S. S. Mississippi, at midnight on 25 April 1854, heard the cry "American, Amer-



MARQUIS HIROBUMI ITO,
Ex-Premier of Japan.

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ican! he found two Japanese gentlemen who had blistered their hands in rowing a fisherman's boat from the shore to get on board the American warship, hoping to be taken to America. Their clothing was stuffed full of writing paper and materials on which they expected to note down what they saw in foreign countries. One of these was Yoshida Shoin, who had long believed in breaking up the hermit policy of Japan and opening his country to human intercourse. Against his own sympathies, and despite their piteous appeal, Commodore Perry, keeping his word of honor, put the two men ashore. Seized as a prisoner, Yoshida was kept in domiciliary confinement in Choshui for five years, finally suffering decapitation and political martyrdom in Yedo, 31 Jan. 1859. He had for his pupils Ito Hirobumi and Inouye Kaoru. Thus early instructed, Ito determined to see the great world. Getting secretly on board a foreign ship, he reached Shanghai. While his other companions went to Europe by steamer, he and Inouye worked their way before the mast. In London he saw and learned much amid varied experiences, meanwhile making up his mind that Japan must change her entire civilization, cease being Oriental and become modern, or else go the way of India and the conquered Asiatic nations. Hearing that his feudal lord, having erected batteries commanding the straits of Shiminoséki, was about to defy the combined fleets of Great Britain, France, Holland, and the United States, he hastily left for Japan, but at home his efforts did not prevent that bombardment of 5 Sept. 1864 which so enlightened the eyes of the Choshui men, leading them to sink their clan feuds and join with Satsuma, Tosa, Echizen, and others for the restoration of the emperor's power and the unity of all Japan. Active as one of the younger men in the revolution of 1868, he saw the necessity of a uniform coinage. Visiting the United States, he studied American financial history, and on his return the decimal system of money and a mint at Osaka were established. He was one of the first to propose the abolition of feudalism, and in 1872-3 went round the world in the embassy to obtain from the Powers revision of the treaties. As minister of public works he established a college of engineering and secured the building of the railway from Yokohama to Tokyo. After serving as head of the Home Office he visited Europe in 1876 to study the constitutions of the various countries with the idea of forming a written constitution, in fulfilment of the emperor's oath of 1868 to create representative government. He became an intense admirer of the Bismarckian methods and system, and on his return inaugurated a radical plan for altering social customs. As minister president of state, he reconstructed the government, eliminating men of the older traditions and putting in men of modern training. He carried out drastic reforms in economy, besides reconstructing law and codes which, departing widely from those hitherto built on Chinese models, were made in harmony with the jurisprudence of Western countries. In 1888 there was a conservative reaction, and Ito retired to prepare, with three others, the constitution, which was finally promulgated 11 Feb. 1889. Though astonishingly liberal in matters of conscience and personal liberty, it follows the Prussian model in making the ministers responsible

not to the Diet but to the emperor, against which provision the Liberals, eager to follow American and English precedents, have made unceasing protest. This struggle is the key to Japanese politics. Ito wrote a volume of commentaries on the constitution, translated into English by Ito Myoji. Again called to the premiership, he averted a political crisis at home and directed the diplomacy of the Chino-Japanese war of 1894-5. Resigning the premiership, he traveled in Europe, and on his return was again called by the emperor to form a government, and besides working for the Anglo-Japanese alliance, sent 21,000 fully equipped soldiers to join the allies and relieve the legations at Peking. In 1901, after the fall of his "coalition cabinet," he was succeeded by Katsura and went abroad for travel. In the United States for health, he received at Yale University the degree of LL.D. In 1904 he was the emperor's special envoy in Korea to consummate the alliance of the two countries. Enjoying the full confidence of his sovereign, he is, despite his opportunist proclivities, probably the best all-round statesman in Japan's modern history, incarnating, as he does, her past, present, and future.

WILLIAM ELLIOT GRIFFIS,
Author of 'The Mikado's Empire.'

Iturbide, ē-toor-bē'dā, Augustin de, emperor of Mexico: b. Valladolid de Michoacan (now Morelia), Mexico, 27 Sept. 1783; d. Padiña, State of Tamaulipas, 19 July 1824. In 1810 he was lieutenant in the provincial regiment of his native city, but on the breaking out of the troubles in Mexico joined the royalist party, and in this cause displayed such valor and ability that in 1816 he rose to the command of what was called the northern army, which occupied the provinces of Guanaxuato and Valladolid. In 1820 the imprudent acts of the Spanish cortes produced so much exasperation among the clergy and the partisans of absolutism in Mexico, that these persons united to effect the independence of their country, selecting Iturbide as their agent, and appointing him commander of the army in the south. He quickly bore down all opposition, and became so popular that he had himself proclaimed Emperor of Mexico, in July 1822, under the name of Augustin I. The Congress declared the throne hereditary in his family, and voted him a yearly allowance of \$1,500,000. His troubled reign came to an end in less than a year, by his abdication in March 1823. Congress granted him on his abdication a yearly pension of \$25,000 on condition of his leaving the country, making sufficient provision for his family in case of his death. He resided in Leghorn for about a year, when he was induced to make an attempt to recover his lost crown. He landed with but a single attendant at Soto la Marina, and was arrested and shot. His family settled in Philadelphia, where his widow died in 1861. Several of his sons subsequently held positions under the Mexican government, the eldest, Prince Angel, dying in the City of Mexico in 1872, the youngest, Prince Augustin, dying in Paris in 1873. Prince Angel's son, Augustin, b. 1864, was adopted by the Emperor Maximilian as his heir, Maximilian himself being childless. The collapse of the second empire, however, destroyed his chances of a throne.

IUKA — IVORY

Iuka, Miss., a small village on the Memphis & Charleston railroad, in the northern part of the State, about 115 miles east of Memphis, was the scene of a severe engagement during the Civil War. Early in September, 1862, it was occupied by a small Union regiment as an outpost. On the morning of 13 September Gen. Sterling Price, moving north from Tupelo with a force of 14,000 men, to prevent Grant from sending reinforcements to Gen. Buell in Kentucky, drove the Union regiment from the village and occupied it, and on the 19th was about moving to Rienzi on the Mobile & Ohio Railroad to form a junction with Earl Van Dorn's army preparatory to an attack upon Corinth. Gen. Grant had been closely watching the movements of Price and Van Dorn, and when he heard that Price had occupied Iuka he determined to attack and cut him off before he could effect a junction with Van Dorn. Gen. Rosecrans, who was near Corinth with 9,000 men, was ordered to move south to Rienzi and Jacinto, then eastward, and, marching on the roads from Jacinto and Fulton, to attack Iuka from the south. Gen. Ord, with 6,500 men, was to move along the Memphis & Charleston Railroad to Burnsville, thence by roads north of the railroad, and to attack on the north and west of Iuka. Grant accompanied Ord, who reached Burnsville on the 18th, and encamped within six miles of Iuka, which he proposed to attack early in the morning; but Grant, hearing that Rosecrans had been delayed in his movements and would not probably be up in time to attack next day, instructed Ord not to move to the attack until the sound of Rosecrans' guns was heard south of Iuka. Rosecrans, with the two divisions of Hamilton and Stanley, moved from Jacinto at 5 o'clock in the morning of the 19th and, after a march of 18 miles, at 4 P.M. his advance division (Hamilton's), about two miles south of Iuka, encountered Little's division of Price's command, Maury's division remaining in the north of Iuka, to confront Ord. Little had about 4,000 men, with which he attacked Hamilton vigorously before the latter could complete his lines. After a very severe fight, Hamilton was driven back some 600 yards, abandoning nine guns; but, receiving three regiments of Stanley's division as a reinforcement, he rallied and regained part of his lost ground, when darkness ended the fighting. Gen. Price reports: "The fight began, and was waged with a severity I have never seen surpassed." Price prepared to renew the battle in the morning; but, convinced by his subordinates of the critical position he was in with Rosecrans in his front and Ord in rear, retreated southward by the Fulton road, which Rosecrans had failed to close as was intended. Ord did not hear the sounds of battle on the 19th, but, advancing on the morning of the 20th, found that Price had escaped. Price retreated southward and reached Baldwyn 23 September. Rosecrans and Ord returned to Corinth. Rosecrans reported a loss of 144 killed, 598 wounded, and 40 missing. Price reported a loss of 86 killed and 408 wounded; Union estimates placing it much higher. Consult: 'Official Records,' Vol. XVII.; Greene, 'The Mississippi'; the Century Company's 'Battles and Leaders of the Civil War,' Vol. II.

E. A. CARMAN.

Ivan, ē-vän', the name of several rulers distinguished in Russian history. The most celebrated are the Grand Dukes Ivan III. and Ivan IV., who laid the foundations of the Russian Empire, the latter (b. 1529; d. 1584) being commonly known as Ivan the Terrible. (See RUSSIA.) Ivan VI. was son of the Grand-princess Anna and of Antony Ulrich, duke of Brunswick-Wolfenbuttel. The Empress Anna, 1740, declared him her successor, and her favorite Biron was to be his guardian and regent. Biron caused the oath of allegiance to be taken to the prince, and when he was banished the parents of the child assumed the reins of government until the daughter of Peter I., Elizabeth, ascended the throne. The young Ivan was taken from his cradle by soldiers, and shared the fate of his banished and imprisoned parents.

Ivanhoe, the title of one of Sir Walter Scott's most famous novels, written and published in 1819. The manuscript is now at Abbotsford. Immediately after its appearance, 'Ivanhoe' became a favorite, and now ranks among the most brilliant and stirring of romantic tales. The scene of the tale is England in the reign of Richard I.

Ives, ivz, Brayton, American financier: b. Farmington, Conn., 1840. He was graduated from Yale in 1861, served in the Union army in the Civil War, attaining the rank of colonel, 5th Connecticut infantry, and brevet brigadier-general, in 1867-89 was a broker of New York, and in 1878-9 president of the New York Stock Exchange. At one time president of the Northern Pacific railway, he later was chosen to the presidency of the Metropolitan Trust Company of New York.

Ives, Frederic Eugene, American inventor: b. Litchfield, Conn., 17 Feb. 1856. He received a public school education; was director of the photographic laboratory at Cornell University in 1874-8, and has lectured before scientific societies in this country and in England. Among his inventions are the process of half-tone photo-engraving (1878); and the three-color printing process in the typographic press. He has published: 'Isochromatic Photography with Chlorophyll' (1866); 'A New Principle in Heliochromy' (1889); etc.

Ivory, properly the substance of which the tusks of the elephant consist, though the similar substance constituting the tusks of the hippopotamus and the horn of the narwhal is also so called. There is also a wholly different substance known as vegetable ivory (q.v.). Ivory is prized for its beautiful color, the fineness of its grain, and the high polish it is capable of receiving. That of the African elephant is most esteemed by the manufacturer for its density and whiteness. It is used as a material for knife-handles, pianoforte keys, combs, the backs of brushes, billiard balls, chess-men, carved figures, and ornamental articles of various kinds. Thin plates of ivory are used as panels for miniature paintings, and etchings are sometimes executed on such plates. The ivory of the hippopotamus is preferred by the dentist. The shavings and sawdust of ivory, by burning in a crucible, are converted into a black powder, from which is prepared a pigment known as ivory black. Ivory may be stained or dyed. The use of ivory was well known in very early

IVORY-BILL — IXION

ages. The ancients were acquainted with the art of sculpturing in ivory, of dyeing and inlaying it, and they often employed it in statuary. Some of the most famous Grecian statues were chryselephantine, that is, were overlaid with plates of gold and ivory in conjunction. To provide the world's supply of ivory it is estimated that 9,000 to 12,000 elephants are killed annually. The medium weight of a tusk is about 60 pounds, but some are found weighing as much as 170 pounds.

Ivory-bill, the great black-and-white, scarlet-crested woodpecker (*Campetherus principalis*), formerly numerous and greatly admired throughout the Southern States, but now surviving only in a few of the most secluded cypress swamps of the Gulf coast. Its extermination was begun by the Indians, who valued highly its splendid head-feathers as an ornament for warriors; and completed by sportsmen and plume-hunters. The books of Wilson, Audubon and early writers on American animals give many interesting facts as to its habits.

Ivory Palm, a South American palm-tree yielding corozo-nuts,—large white seeds called "vegetable ivory" (q.v.).

Ivory, Vegetable. See VEGETABLE IVORY.

Ivy, a popular name for various climbing, creeping, and drooping herbs and shrubs, the most widely known of which are the following: Common or English ivy (*Hedera helix*) is a tall climbing evergreen shrub of the order *Araliaceæ*, widely planted in Europe (where, as in Northern Africa and Eastern Asia, it is native), and in the warmer parts of the United States, its ornamental, abundant foliage being highly valued for covering walls, rocks, and trellises. Its small and inconspicuous greenish, perfect flowers appear late in the autumn and the small black fruits (three to five seeded berries) ripen the succeeding year. The fruits, which are devoured by birds, are bitter and pungent, and were formerly in medicinal repute. The gummy juice obtained from the stem, as also the fruit, contains the bitter principle hedelin and the hederic acid characteristic of the plant. It has been used in making varnish. Contrary to popular opinion, ivy is not parasitic upon such trees as support it. It merely clings to them by its numerous hold-fast roots produced along the entire length of its stems. Such trees as it injures are killed by constriction. The other popular notion that it makes the walls and houses upon which it climbs damp and unhealthy is also erroneous; in reality it dries them, the roots abstracting such water as reaches the wall through the dense foliage; yet exceptional cases of damage occur. It has numerous horticultural varieties which differ mainly in the form, color and markings of the leaves. These succeed best in rather moist, rich soils and shady positions and are not usually found to be hardy much farther north than New York unless well protected from the winter sun, as upon the north side of buildings, etc. As a cool greenhouse and a house plant it is very popular. Ivy leaves and ivy berries were formerly administered for various medicinal purposes, but they have been long out of use. The leaf and habit of the common ivy are so characteristic that reference is often made to them in the

specific names of other plants, "ivy-leaved" being common as a designation. The plant takes a prominent place in mythology and folk-lore.

Japanese or Boston ivy (*Ampelopsis tricuspidata*) and its near relative Virginia creeper (*A. quinquefolia*) of the order *Vitaceæ*, are probably the next best known species to which this name is applied. The former is the more graceful, and is gradually gaining in general favor over the latter, which demands more attention to keep it looking presentable. Both climb by means of tendrils, but the Boston ivy clings better to walls. It has three-lobed leaves; its rival, five-lobed. Both have brilliant autumnal colors in the north, where the Virginia creeper is the more hardy.

Among the herbaceous ivies Kenilworth ivy (*Linaria cymbalaria*), German ivy (*Senecio mikanooides*) and ground ivy (*Nepeta glechoma*) are best known in America. They are all popular greenhouse plants and are frequently planted in hanging-baskets because of their graceful habits. Poison-ivy or poison-oak is a climbing sumach whose leaflets somewhat resemble those of Virginia creeper, but are in threes instead of fives (see POISON-IVY).

Iwakura, Tomomi, Japanese reformer and statesman: b. in Kioto in 1825 of illustrious ancestry, one of the Kuge or court nobility, chamberlain of the imperial household, and at first in favor of the expulsion of foreigners. He never saw a foreigner until he was 43 years old. Becoming a Progressive, he was banished into exile and shaved his head, but his real aim was to restore the lustre of the imperial throne by the overthrow of the Yedo Shogunate. Entering into communication with the leaders of the confederation of southern daimios, he became the link between court nobility and the progressive samurai or gentry, and took a prominent part in the Restoration of 1868. He was one of the first to send his three sons to be educated under Verbeck and to America. He received high office and salary, and in 1870, as envoy of the mikado to the recalcitrant Satsuma leaders, led in the movement to abolish feudalism, and was prominent in securing the formation of a new national army. As minister of foreign affairs and junior premier, he was visited by his sovereign. He went to Europe and America as head of the great embassy of 1872. He admired greatly the government at Washington. He left a powerful impress on the nation and the sovereign, and received the highest honors due to a subject. Escaping all attempts at assassination, he died quietly in his bed 20 July 1883. Of his children, a son, Prince Iwakura Tomosada, of the House of Peers, is special attendant upon the emperor, and the other, a daughter, is at the head of the Red Cross work in Japan. .

WILLIAM ELLIOT GRIFFIS,
Author of 'The Mikado's Empire.'

Ixion, iks-i'ón, in Greek mythology, king of the Lapithæ in Thessaly, son of Phlegyas. He married Dia, daughter of Deioneus. He became enamored of Hera, and attempted to seduce her. Zeus made a cloud in the shape of Hera, and carried it to the place where Ixion had appointed to meet her. Ixion was caught in the snare, and from his embrace with the cloud were born the Centaurs. (See CENTAURS.) Zeus banished him from heaven:

IYAR — IZARD

struck him with his thunder, and ordered Hermes to tie him to a winged or fiery wheel in Hades.

Iyar, the eighth month of the Jewish year, corresponding, at the earliest, with April; but it may be as late as May; it has only 29 days.

Iz'ard, George, American general: b. Richmond, Surrey, England, 1777; d. Little Rock, Ark., 22 Nov. 1828. He was a son of Ralph Izard (q.v.). He was graduated from the College of Pennsylvania in 1792, and after a tour in Europe was appointed in 1794 a lieutenant in the regiment of artillerists and engineers in the United States army. Upon the breaking out of the War of 1812 with Great Britain he served as colonel of the 2d artillery, and was successively promoted to be brigadier-general and major-general. At one period of the war he held chief command of the northwest frontier. In 1825 he became governor of Arkansas Territory, in which office he died.

Izard, Ralph, American statesman: b. near Charleston, S. C., 1742; d. South Bay, near Charleston, 30 May 1804. He was educated at Christ's College, Cambridge, England, and, in-

heriting an ample fortune, established himself in 1771 with his family in London, whence the troubled condition of American politics induced him in 1774 to retire to the continent. He subsequently endeavored to impress upon the British ministry the ill-advised nature of the course they were pursuing, but without effect. In 1780 he returned to the United States, and found occasion to serve the country in various ways, having been instrumental in procuring the appointment of General Greene to the command of the southern army, and having once pledged his whole estate as security for funds needed in the purchase of ships of war in Europe. In 1781 he entered the Continental Congress, of which he remained a member until the peace; and upon the adoption of the Federal constitution he was elected a United States senator from South Carolina. As a legislator he was able and eloquent and in the senate possessed the confidence of all parties. The 'Correspondence of Ralph Izard from 1774 to 1804, with a Short Memoir,' was published by his daughter (1844).

Izard, the chamois (q.v.); so called in the Pyrenees.

J

J the tenth letter of the English alphabet, was unknown to the ancient Latins and Greeks as an alphabetic character and representative of a vocal sound.

Till the 16th century the Latin and other alphabets of western Europe had only the letter i to represent both the vowel sound i and the consonant sound now represented by j: at least in fonts of type of that century, and till the end of that century or later, the character i served to represent both the vowel and the consonant, though a distinction was made between them in manuscripts of the previous century by continuing the stroke of the i a little below the line when it stood for the consonant. This letter j from the first represented in English the sound of dzh, in French that of zh; in German and other languages its value is that of the consonant y; for example, Julius, pronounced yulius, jacio, pronounced yacio.

For speakers of the modern European languages the j in Latin has usually the same value as in their native tongues. But though for Spaniards j in Latin is equal to y, in their own speech j is a strong guttural aspirate that might be represented in English by kh. The sound of j in English is always represented in Italian by g: the French and English journal is in Italian *giornale*, the Latin *judex*, English judge is in *italian giudice*.

The sound of dzh is represented in English not only by its proper letter j, but also by g and by dg: jest, gem, edge.

Jabiru, jab'i-roo, a large species of stork (*Mycteria americana*), somewhat resembling the adjutant, found nearly throughout South America and northward into Mexico and Texas. It is about five feet high, with stilt-like legs, and massive, slightly upcurved beak; the plumage is white and the naked head and neck black. In habits it resembles the other storks (q.v.). Several related Oriental species have received the same name.

Jaborandi, a Brazilian shrub (*Pilocarpus pennatifolius*) of the order *Rutaceæ*, which yields a volatile oil from which is derived a principle (pilocarpin) in the form of an amorphous white powder having properties similar to atropine. It is the basis of the drug jaborandi, which is diaphoretic and sialagogic in its effects. Other "jaborandis" are obtained from species of *Serronia*, *Aubletia* and *Piper*.

Jac'amars, a group of small, gaudy, South American birds of the family *Galbulidae*, and related to the puff-birds and woodpeckers. Their plumage is highly colored, reds and bronzy

greens and blues predominating. They live mostly along the outskirts of forests, and feed upon large insects caught in flight. White eggs are laid in holes in earthen banks; and a whistling song is given during the breeding season.

Jaganas, zhä-sä'nä or jä-kä'na, a group of birds (*Parridae*) related to the rails, and remarkable for the extraordinary length of the toes, which are further extended, especially the hallux, by long, slender claws. There are four genera and about a dozen species, most of which inhabit the Old World—Africa, India, and Australia. The genus *Parra* is American, and one Mexican species (*Parra spinosa*) enters Texas. The beak is plover-like and the bend of the wing bears a stout and acute horny spur; the plumage is of a rich purplish brown with the wings green and black. The great spread of the toes enables these birds to walk with ease on the floating leaves of water lilies and similar plants, otherwise their habits are much like those of rails (q.v.).

Jacaran'da, a genus of tropical American trees of the *Bignonia* (q.v.) family. One (*B. brasiliiana*) yields the wood called jacaranda wood, or blue ebony, which is very hard and capable of receiving a fine polish. The name is carelessly applied to several other South American woods used in cabinet-work.

Jacaré, zhä-kä-ra' or jäk'a-rë, a South American name for an alligator of the genus *Caiman*, of which the large black species (*C. niger*) reaches a length of 20 feet and is called on the upper Amazon jacaré-nassu, while the jacaré-tinga (*C. trigonatus*) is only six feet long, and has a slender muzzle and black-banded tail. See CAYMAN.

Jack, a pike; in the United States, the common eastern pickerel (q.v.) is most usually meant. The wall-eyed pike (q.v.) is called "jack salmon" in some parts of the West. Several marine fishes are known as jack fish, amber jacks, etc., especially among the lively sea-bass, groupers, amber-fish and the like. The term, as in other cases, implies a quality in the animal exciting friendly interest and admiration.

Jack, or **Jack-tree** (native name *Jaca*), a tree (*Artocarpus integrifolia*), related to the bread-fruit (q.v.), a native of India and southeastern Asia. The fruit grows to a larger size than the bread-fruit of the Southern Pacific islands, often weighing more than 30 pounds, and containing from 200 to 300 seeds, each of them four times as large as an almond. The seeds or nuts are eaten after being roasted or boiled, and the sweet fleshy pulp of the fruit is also eaten. When the tree is young the fruit

JACK AND THE BEANSTALK — JACKDAW

grows from the twigs; in middle age it grows from the trunk; and when the tree gets old, from the roots. It forms a great part of the food of the natives in some portions of India, Ceylon, etc. The yellowish timber is used for almost every purpose, being strong and ornamental, and yields a yellow dye.

Jack and the Beanstalk, an English nursery tale relating to the heroism of a boy. Its analogue occurs in many national folk-lore legends. It is supposed to represent in a figure the restoration to the earth of those fertilizing and elemental activities, which are necessary to human life. The harp is the wind, which drives the ships and turns the mills to grind the wheat. The bags of treasure are the rain-drops that scatter wealth and plenty. The red hen is the sun that brings life to birth by its fostering heat.

Jack and Jill, the first words of an old nursery rhyme, of considerable folk-lore interest. Jill is a corruption of the French Julianne, once common in England under the form Gillian. It also appears in the legend of St. Kilian, where Geilana vindictively causes the good bishop's death. This incident of Jack and Jill is probably based on one of the moon myths of Scandinavia. The Norse peasant sees in the spots on the moon the two children rescued by the moon from their father, who had forced them to draw water all the day.

Jack the Giant Killer, the hero of an English nursery story, which reflects triumph of skill over strength and bulk such as makes the point of the story in David and Goliath, Ulysses and Polyphemus, etc. The English form is based upon the legend that St. Michael's Mount, in Cornwall, was once the fortress or castle of a giant, who was dislodged by the valor of an English knight. In adapting the story so as to claim the sympathies of children the knight is made to take the shape of a child.

Jack Horner, the first words of an old nursery rhyme. The rhyme is said to be based on a historic fact. Horner was the messenger whom the abbot of Glastonbury sent to Henry VIII. with the deeds of certain manors involved in the dissolution of monasteries. Horner obsequiously handed the parcel to the royal spoliator, but first of all managed to abstract the deeds of the manor of Wells, a "plum" indeed, and the abbot was afterward punished on the charge that he had withheld them.

Jack-in-the-Pulpit, or **Indian Turnip**, a perennial herb (*Anisoma triphyllum*) of the arum family (see *Araceæ*). Its name is derived from its spadix, which is upright, with the spathe surrounding and arching over it, suggesting a preacher in an old-fashioned pulpit with a sounding-board. It is common in the United States, east of the great plains, in damp, shady woods and in moist garden soil; and when the spathe falls away in early summer, the red berries are prominently shown in the form of a dense ovoid head. Its acrid tuber or corm is valued for its medicinal properties, and may be made edible by boiling.

Jack-snipe, a gunner's term for a shore-bird, also called grass or meadow snipe, which is in reality a sandpiper, named in books the pectoral sandpiper (*Tringa maculata*). The per-

version of names is due to its somewhat game-like habits of lying to a dog and flushing correctly from the grass, like a true snipe which render it an attractive object of pursuit; beside which, in the fall it becomes very fat, and it is then excellent eating. Unlike most sandpipers, it does not flock, at least to any extent, being oftenest found scattered singly or in pairs. In the United States it is chiefly, if not wholly, a bird of passage, breeding in Canada and wintering in the tropics. It is nine inches long, clay-colored, striped with blackish above; breast ashy and sharply streaked; belly white. Consult authorities mentioned under shore-birds.

The English "jack-snipe" is a true snipe (*Gallinago gallinula*) of very small size, and therefore also known as "half-snipe."

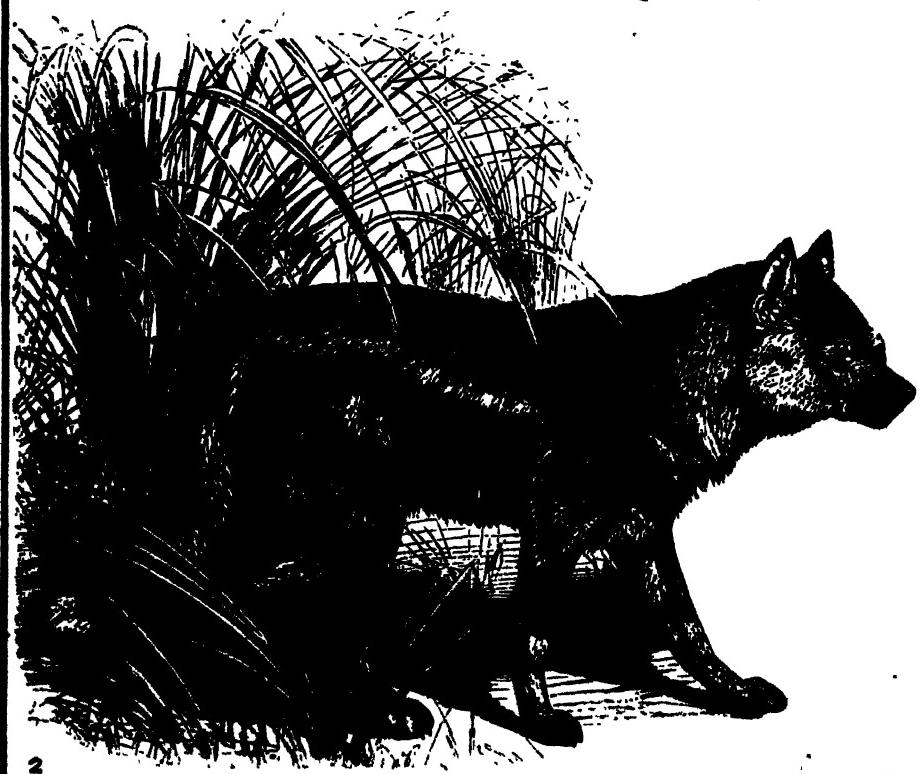
Jack' al, a small active wild dog or wolf of the warmer regions of the Old World, found in southeast Europe, Africa, Syria and southern Asia. The common jackal averages about 2 or 2½ feet in length, and about 14 inches in height, with a bushy tail about 8 inches long. The eyes are small, and the pupil is round. The general color of the body is a dirty yellow or brown, lighter on the throat and belly. Jackals inhabit holes and burrows whence they come forth in the evening to hunt in packs. Their cry consists of a series of prolonged howls, followed by shorter yelps, much like that of the American coyote. The jackal subsists largely upon carrion, often that left after the repast of the fiercer and larger carnivora: but it also kills prey for itself, a pack hunting down antelopes, deer, or other animals, besides getting much small fare, as mice, lizards, insects and the like. They also eat certain kinds of vegetable food, and sometimes they do considerable damage to sugar and other plantations. The jackal is susceptible of being tamed, but its odor makes it by no means a desirable domestic animal. It is believed to be exceedingly cunning, and in many Eastern tales, especially among the people of India, plays exactly the same part as the fox does in those of Europe. It is probable that jackals have contributed frequently to the commingled stock represented in our domestic dogs, some of which betray very jackal-like points. They inter-breed with domestic races.

The common jackal (*Canis aureus*) is the most widely distributed species: but another species, found mostly in southern Africa, is the blackbacked jackal (*C. mesomelas*). This latter form has the back and end of the tail black, the other parts mostly red or yellowish-red. A third species of jackal found in South Africa is the canduc (*C. adustus*), marked by a light stripe on the sides. Consult: Mivart, 'Dogs, Jackals, Wolves and Foxes' (London 1890).

Jackass Kingfisher, or **Laughing Jackass**, the name of a large inland kingfisher (*Dacelo-gigas*) of Australia, given by the colonists in allusion to its loud, hoarse cry. It is about 17 inches long, brown in general color, does not frequent water or catch fish, but lives on insects, small reptiles, etc., and lays its eggs in a hole in a tree.

Jack'daw, a small, black European crow (*Corvus monedula*), with black legs and feet

JACKALS.



2

1. Common Jackal.

2. Side-striped Jackal.

JACKMAN — JACKSON

and grayish neck. They inhabit towers, spires, and like elevated situations, and even in towns and populous cities are present and breed freely. The nests and eggs are like those of other crows (q.v.) which they resemble in general habits. Jackdaws are easily tamed, learn to pronounce many human words, and are most amusing pets, but are mischievous and thieving, like magpies.

Jack'man, Wilbur Samuel, American educator: b. Mechanicstown, Ohio, 12 Jan. 1855. He studied at Allegheny College (Meadville, Pa., 1880-2), was graduated from Harvard in 1884, and later became dean of the school of education in the University of Chicago, and head of the natural science department of the school. In 1899-1900 he visited Holland, France, and Germany for the study of educational methods. In addition to many articles on pedagogical topics, he has published: 'Nature Study for the Common Schools' (1891); 'Number Work in Nature Study' (1893); 'Field Work in Nature Study' (1894); 'Nature Study Record' (1895); 'Nature Study and Related Subjects' (1898); and 'Nature Study for the Grammar Grades' (1898).

Jackrabbit. See HARES.

Jack'son, Abraham Valentine William, American Indo-Iranian scholar: b. New York 9 Feb. 1862. Graduated from Columbia in 1883, he was Fellow in letters there (1883-6), instructor in Anglo-Saxon and the Iranian languages (1887-90), and, after study at Halle (1887-9), adjunct professor of English language and literature (1891-5). In 1895 he was appointed professor of Indo-Iranian languages at Columbia. By way of recognition of the instruction given by him in their ancient books, the Parsees made to the Columbia library the gift of an important manuscript collection of Zoroastrian works. He appeared also as a public lecturer, became one of the directors of the American Oriental Society, and in addition to numerous contributions to the 'Journal' of that society and other learned periodicals, wrote: 'A Hymn of Zoroaster, Yasna XXXI.' (1888); 'An Avestan Grammar' (1892); 'An Avestan Reader' (1893); 'Zoroaster, the Prophet of Ancient Iran' (1899).

Jackson, Abraham Willard, American Unitarian clergyman and author: b. Portland, Maine, 7 April 1843. He was graduated from Colby University (Waterville, Maine), entered the Union army as private in the 8th Maine volunteers, became captain in the 33d United States colored troops, in 1872 became pastor of the Unitarian Church at Peterboro, N. H., and subsequently of that at Santa Barbara, Cal. In 1894-5 he was acting professor of philosophy in the Meadville Theological School. Among his writings are: 'The Immanent God' (1880); 'James Martineau: a Biography and Study' (1900); 'Deafness and Cheerfulness' (1901).

Jackson, Andrew, seventh President of the United States: b. Waxhaw settlement, N. C., 15 March 1767; d. near Nashville, Tenn., 8 June 1845. He was of north of Ireland ancestry, his father emigrating to America from Carrick Fergus in 1765. As a boy Jackson was reckless, impetuous, quarrelsome, and passionate in temper; thoroughly disinclined to learning of

any sort, his favorite pursuits were racing, gambling, and cock-fighting, but he was possessed of invincible determination, dauntless courage, and excelled in marksmanship and riding, qualities which later served him well. After some desultory law study in Salisbury, S. C., he became in 1788 public prosecutor of the Western District of North Carolina (that is Tennessee). In 1791 he married Rachel Robards, both supposing the latter's husband, Lewis Robards, had secured a divorce by act of the Virginia legislature. This proving not to be the case, they were remarried in 1794. This incident was frequently used against Jackson in his political campaigns, but his only fault was in not ascertaining more surely the exact terms of the Virginia act. A member of the Knoxville convention which drafted a constitution for Tennessee, Jackson was elected the first Federal representative of that State after its admission to the Union, June 1796. Appointed U. S. Senator in 1797 he resigned in April 1798 to become judge of the Tennessee supreme court, holding the position until 1804 when he retired to devote himself to settling his private affairs which had become heavily involved in debt. Between 1806-11 he led the life of a planter, storekeeper and private citizen without noticeable incident. Upon the outbreak of the war of 1812 Jackson, then major-general of Tennessee militia, promptly offered his services with those of 2,500 volunteers. New Orleans being considered a probable objective of the enemy, Jackson was sent there, 7 Jan. 1813, but was soon ordered to dismiss his troops and return. Thoroughly enraged, he hired transportation on his own authority and marched his men home in a body, refusing to disband them without pay or rations, five hundred miles from home. In June the government reimbursed him for the expenses incurred. It was during this expedition his soldiers bestowed on him the affectionate name of "Old Hickory." On 30 Aug. 1813, the massacre of the garrison and refugees at Fort Mims, at the junction of the Alabama and Tombigbee rivers occurred. Tennessee at once voted men and money to aid in suppressing the Indian outbreak. Jackson, though suffering from a wound received in a tavern brawl, took the field, and in a whirlwind campaign completely crushed the Creeks at Horseshoe Bend, Alabama, 27 March 1814. On 14 March 1814, he ordered John Wood to be shot for insubordination and assaulting an officer, the first of the military severities afterward brought up against Jackson during his Presidential campaigns. On 31 May 1814 he was appointed major-general of the United States army, commanding the department of the South. In November, without orders from Washington he marched against the English Pensacola, easily stormed the town and compelled their withdrawal. Proceeding to New Orleans he began energetic preparations for defense, amid the greatest difficulties and who lacking in proper means and materials. On 28 Dec. 1814 and 1 Jan. 1815 he gained minor successes against the British. On 8 Jan. 1815 General Pakenham with 10,000 veteran troops delivered a grand assault upon Jackson's works. The result was a complete defeat and rout of the British, they losing over 2,600 in killed, wounded and prisoners, while Jackson's loss was seven killed and six wounded. The treaty of peace

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had been signed at Ghent 24 Dec. 1814, but Jackson did not learn of it until 6 March 1815. Accordingly he relaxed none of his vigilance, but kept the city under martial law, during which his characteristic highhandedness brought him into sharp conflict with the civil authorities. For disciplinary reasons six soldiers were court-martialed and shot on 21 February. But Jackson's brilliant and unexpected victory, the one great land success of the War of 1812, set the country afire with enthusiasm. From an obscure planter he immediately became the most popular man in the country. Resolutions of thanks and praise poured in on him from State legislatures; Congress voted him its thanks and a gold medal, and his exploit was the political salvation of the tottering administration. During the Seminole war Jackson was ordered to take command in Georgia, December 1817. Within five months he broke the Indian power completely, established peace on the border, and practically conquered Florida. His hasty measures, undertaken on inadequate facts and information, caused considerable anxiety and discussion in the government. His invasion of Florida and capture of St. Marks, a Spanish possession, and his summary execution of Arbuthnot and Ambrister, two British subjects, seemed likely to raise delicate diplomatic situations. Upon the acquisition of Florida Jackson was appointed its first territorial governor, April 1821, with almost the powers of a Spanish captain-general, but, disgusted with the office, he resigned in October. Parton describes his conduct while governor as "arrogant and disgraceful." In 1823 he declined the mission to Mexico, and was an unsuccessful candidate for the presidency in 1824. But in 1828 backed by the powerful influence of Van Buren in New York and his own popularity in Pennsylvania, which thus assured him the support of the two largest eastern states, Jackson was triumphantly elected President, the first representative of the new West and the masses. In 1832 he was re-elected by a larger electoral vote than in 1828. His first cabinet was composed of almost unknown men. For advice and counsel he relied chiefly on a group of personal friends and intimates, among them being Wm. B. Lewis, Amos Kendall, a representative of all that was vicious in American political methods, Duff Green and Isaac Hill, partisan editors, and later Francis P. Blair, who edited the '*Globe*' in Jackson's interest. This group formed what came to be known as the "Kitchen Cabinet." In 1830 Jackson endeavored without success to enforce the social recognition of the wife of his secretary of war, John H. Eaton. The chief features of his administrations may be briefly summarized. That to him is due the shackling of the spoils system upon the country may be seen from the fact that between 1789 and 4 March, 1829, there were only 74 removals from office, while during Jackson's first official year there were some 2,000. He vigorously opposed the second bank of the United States, and vetoed the bill renewing its charter, 1832. He put a prompt end to South Carolina's nullification proceedings by his proclamation of 10 December 1832, declaring nullification contrary to the Constitution and incompatible with the existence of the Union, and his active preparations to execute the laws, by force

if needful. In 1834, as a result of his action in ordering the secretary of the treasury to cease making deposits of government funds in the Bank of the United States, the Senate censured him for usurpation of powers not conferred by the laws or Constitution. His Specie Circular of 11 July 1836 directing that only gold and silver be taken at the land offices in payment for public lands was an important factor in the causes leading to the financial crash of 1837. His foreign policy was firm and successful. The disputes with Great Britain over the northeast boundary and the trade between the United States and British colonies, and with France over the indemnity for spoliations committed on American commerce early in the century, were dealt with shrewdly and with success.

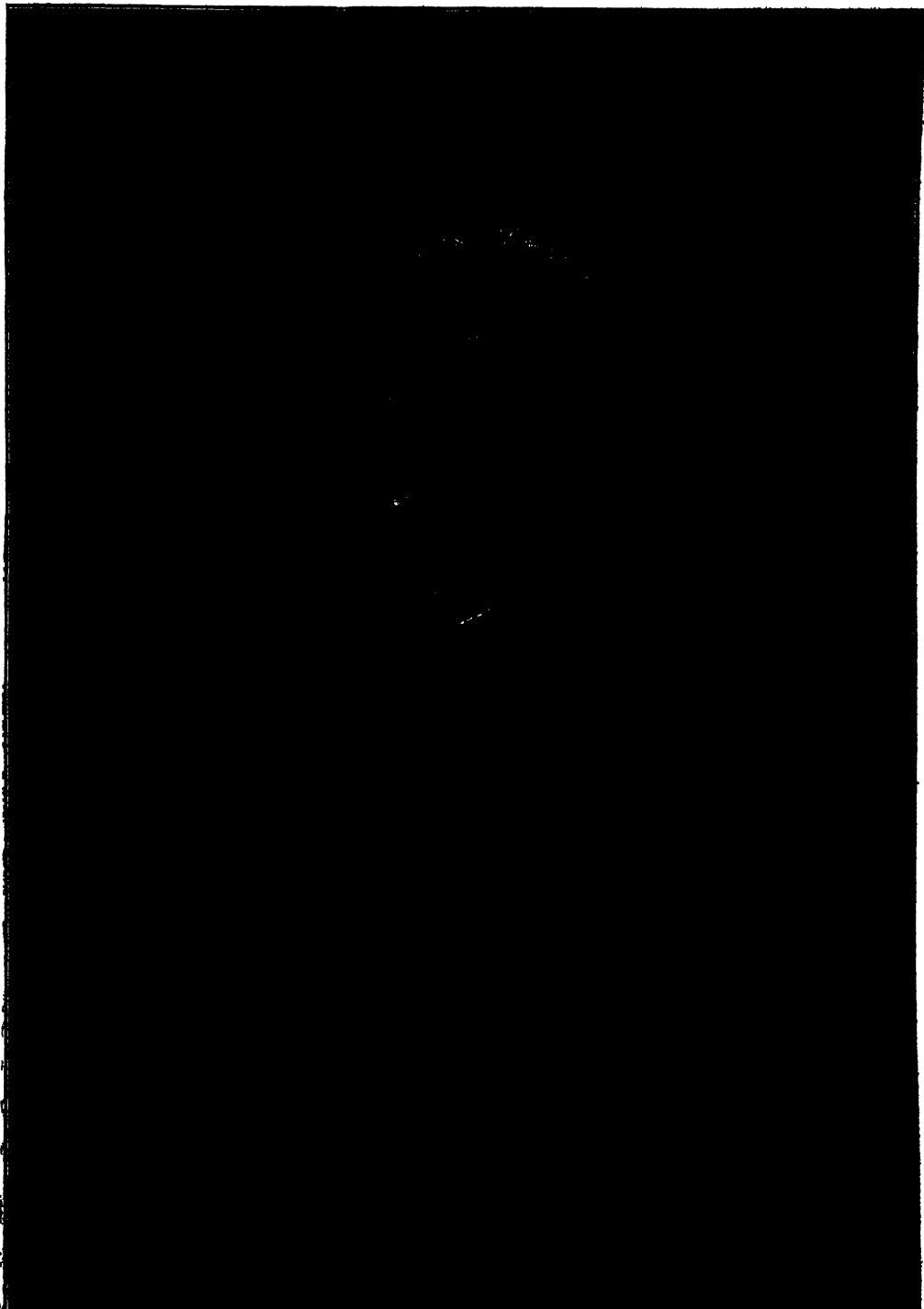
Opinions will always be divided regarding Jackson's character. For thirty years he was a popular idol and the typical man of the "Fourth of July" period in American history. His countrymen easily forgave his faults and warmly admired his incontestable virtues. Extraordinarily illiterate, irascible in the highest degree, intensely patriotic, absolutely honest, terrible in the inflexibility of his purposes, faithful and devoted in his domestic life, a firm friend and implacable enemy, reckless and unflinching in the performance of what he conceived to be his duty, restless under any restraint calculated to hamper him in the discharge of that duty, an autocrat by nature yet a sincere lover of the common people,—such are some of the qualities which will always make Andrew Jackson one of the most picturesque figures in American history.

Bibliography.—Numerous biographies of Jackson exist. The best is still that by James Parton (3 vols., New York 1861); the life by Prof. W. G. Sumner in the 'American Statesman Series' is a careful study of his career as a public man (Boston 1883); the lives by John H. Eaton (Philadelphia 1817), and by Amos Kendall (New York 1843) have value as being written by men who knew him intimately. An excellent working bibliography for the study of Jackson's life and time will be found at the end of Professor Sumner's work.

W. N. C. CARLTON,
Librarian, Trinity College, Hartford.

Jackson, Charles Thomas, American scientist: b. Plymouth, Mass., 21 June 1805; d. Somerville, Mass., 28 Aug. 1880. He was graduated at Harvard Medical College in 1829, and practised for a time in Boston. He claimed to have been the first to indicate, in 1832, the applicability of electricity to telegraphic use, and also claimed, in 1842, to have been the discoverer of the anaesthetic effects of the inhalation of ether. He received the monthly prize of 2,500 francs from the French Academy of Sciences in 1852. He published a 'Manual of Etherization, with a History of its Discovery' (1861), and several 'Reports.'

Jackson, Edward Payson, American educator and author: b. Erzerum, Turkey, 15 March 1840. He was educated at Amherst College; served in the Union army during the Civil War as private of the 45th and lieutenant of the 5th Massachusetts; was principal and superintendent of various educational institutions, and in 1877 was appointed master in the Boston Latin School. His works include:



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'Mathematical Geography' (1873); 'A Demigod' (1886), a story published anonymously, and at first attributed to various well-known authors; 'The Earth in Space' (1889); and 'Character Building' (1892), to which was awarded a prize of \$1,000, offered by the American Secular Union, jointly with N. P. Gilman's 'The Laws of Daily Conduct,' with which it was also published in the volume, 'Conduct as a Fine Art' (1894). He also became the editor of 'The Bohemian,' a Boston magazine of short fiction.

Jackson, Frederick George, English Arctic explorer: b. Alcester, Warwickshire, 1860. He was educated at Denstone College and the University of Edinburgh, made journeys across the Australian deserts and the Great Tundra of Siberia, in 1894-7 was leader of the Jackson-Harmsworth expedition to Franz Josef Land, and during the second Boer war was in command of a company of mounted infantry. During his stay in Franz Josef Land he mapped the region, which he proved to be a collection of islands, and made valuable magnetic and meteorological observations. He was awarded the gold medal of the Paris Geographical Society in 1899, and wrote: 'The Great Frozen Land' (1895); 'A Thousand Days in the Arctic' (1899).

Jackson, Gabrielle Emilie Snow, American writer for young people: b. New York 13 Oct. 1861. She was married to J. W. Jackson in 1886. Among her many publications are 'Denise and Ned Toodles' (1897); 'The Colburn Prize' (1899); 'Pretty Polly Perkins' (1900); 'Laddie and Lassie' (1900).

Jackson, George Anson, American Congregational clergyman: b. North Adams, Mass., 17 March 1846. He was graduated from Yale in 1868, from the Andover Theological Seminary in 1871, was ordained to the Congregational ministry, and in 1872-97 held pastorates successively at Leavenworth, Kan., Southbridge, Mass., and Swampscott, Mass. In 1897 he became librarian of the General Theological Library of Boston. He wrote: 'The Apostolic Fathers' (1879); 'Fathers of the Third Century' (1881); 'Post-Nicene Greek Fathers' (1883); 'Post-Nicene Latin Fathers' (1883); 'The Son of a Prophet' (1894), a historical novel.

Jackson, Helen Maria Fiske Hunt, 'H. H.' American novelist and poet: b. Amherst, Mass., 18 Oct. 1831; d. San Francisco, 12 Aug. 1885. At 21 she married Captain Edward Hunt (d. 1863) of the United States army, and began the wandering existence of an army officer's wife. From 1867 to her death, 16 years later, her pen hardly rested. She wrote verses, sketches of travel, essays, children's stories, novels, and tracts for the time, generally over the pen-name 'H. H.' Her life in the West after her marriage to W. S. Jackson, a banker of Colorado Springs, revealed to her the wrongs of the Indian, which she set herself at once to redress. Newspaper letters, appeals to government officialism, and finally her 'Century of Dishonor' (1881), a sharp arraignment of the nation for perfidy and cruelty towards its helpless wards, were her service to this cause. Her most popular story, 'Ramona' (1884), a romance whose protagonists are of

Indian blood, was also an appeal for justice. This book, however, rose far above its polemic intention; the beauty of its descriptions, its dramatic movement, its admirable characterization, and its imaginative insight entitling it to high rank. Two novels in the 'No Name Series'—'Mercy Philbrick's Choice' (1876) and 'Hetty's Strange History' (1877)—show the qualities that infuse her prose: color, brilliancy of touch, grace of form, certainty of intuition, and occasional admirable humor. She had not the gift of construction, and lacked the power of self-criticism; so that she is singularly uneven. It is no doubt chiefly her poems which have gained for 'H. H.' a place in literature. They reveal genuine lyrical power, although at times marred by defective technique. Among books of hers not already named are: 'Bits of Travel' (1873); 'Glimpses of Three Coasts'; 'Sonnets and Lyrics.' To her have often been attributed the noted 'Saxe Holm' stories.

Jackson, Henry Rootes, American diplomat and soldier: b. Athens, Ga., 24 June 1820; d. Savannah, Ga., 23 May 1898. He was graduated at Yale in 1839, admitted to the bar in Georgia and for several years was district attorney. He served in the Mexican War, became judge of the superior court, and in 1853 went to Vienna as *chargé d'affaires*, and the following year was made minister resident there. Before the outbreak of the Civil War he seceded from the Charleston Convention and, when his state seceded, joined the Federal army. He eventually resigned, and joined the Confederate forces. Near the close of the war he was made a brigadier-general in Hood's army and was captured with his whole command at Nashville after the battle of Franklin. In 1885 he was appointed United States minister to Mexico. He was the author of 'Tallulah, and Other Poems' (1850).

Jackson, Howell Edmunds, American jurist: b. Paris, Tenn., 8 April 1832; d. West Meade, Tenn., 8 Aug. 1895. He was graduated from the University of Virginia in 1854, from the law department of Cumberland University in 1856, began practice in Jackson, and later in Memphis, and upon the organization of the Confederate government became receiver for property in West Tennessee confiscated to the purposes of the Confederacy. Subsequent to the war he became a member of the court of referees of Tennessee, a tribunal which acted as a provisional supreme court in the hearing of cases that had arisen during the war period. Elected to the State legislature in 1880, he took his seat in the United States Senate in 1881, afterward left the Senate to become United States circuit court judge for the West Tennessee district, and in 1893 was appointed an associate justice in the United States Supreme Court.

Jackson, James, American soldier and statesman: b. Moreton Hampstead, Devonshire, England, 21 Sept. 1757; d. Washington, D. C., 19 March 1806. He emigrated to America with his father in 1772, and studied law in Savannah. In March 1776 he aided in repelling a British attack upon that town, and subsequently was appointed brigade major of the Georgia militia. In 1781 he aided in the capture of the fort at Augusta, and was left in command of

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the place, and upon the evacuation of Savannah by the British in 1782 was appointed by General Wayne to receive the keys of the town. In 1789 he was chosen a representative in Congress, and from 1792 to 1795 was a member of the United States Senate. He had the principal share in the framing of the Georgia constitution of 1798, and upon its adoption was elected governor of the State, and held that office until his reelection in 1801 to the United States Senate.

Jackson, James, American physician, brother of Charles Jackson (q.v.): b. Newburyport, Mass., 3 Oct. 1777; d. 1867. He was graduated at Harvard College in 1796; studied medicine in London, and on his return to Boston in 1800 commenced practice there, devoting himself entirely to medical practice, to the exclusion of surgery and other branches. In 1803 he became a member of the Massachusetts Medical Society. In 1810, with Dr. John C. Warren, he brought before the community a proposition for establishing a hospital in the city of Boston. The first result of this was the organization of the asylum for the insane at Somerville, then included in Charlestown, and afterward of the Massachusetts General Hospital in Boston. Dr. Jackson was the first physician, and Dr. Warren the first surgeon, to this institution. In 1810 he was chosen professor of clinical medicine in Harvard, and in 1812 professor of theory and practice, becoming professor emeritus in 1835. His principal publications were: '*On the Brunonian System*' (1809); '*Remarks on the Medical Effects of Dentition*'; '*Letters to a Young Physician*' (1855). Of the last work several editions were printed.

Jackson, Patrick Tracy, American merchant, brother of Charles Jackson (q.v.): b. Newburyport, Mass., 14 Aug. 1780; d. Beverly, Mass., 12 Sept. 1847. At the age of 15 he was apprenticed to a merchant of Newburyport, and subsequently established himself in Boston in the India trade, in which he acquired a handsome fortune. In 1812, at the invitation of his brother-in-law, Francis C. Lowell, who had recently examined the process of the cotton manufacture in England, he engaged in a project to introduce the power loom, then newly invented, and the mode of constructing which was kept secret, into the United States. After repeated failures they succeeded in 1812 in producing a model from which a machine was subsequently constructed by Paul Moody. In 1813 they built their first mill at Waltham, near Boston, the first in the world that combined all the operations for converting the raw cotton into finished cloth. In 1821 Jackson made large purchases of land on the Merrimack River near the Pawtucket canal, on which a number of mills were constructed by the Merrimack Manufacturing Company, a corporation organized under his auspices. This settlement formed the germ of the present city of Lowell. He procured in 1830 a charter for a railroad between Lowell and Boston, the construction of which he directed until its completion in 1835.

Jackson, Samuel Macauley, American church historian: b. New York 19 June 1851. He was graduated from the College of the City of New York in 1870, from the Union Theolog-

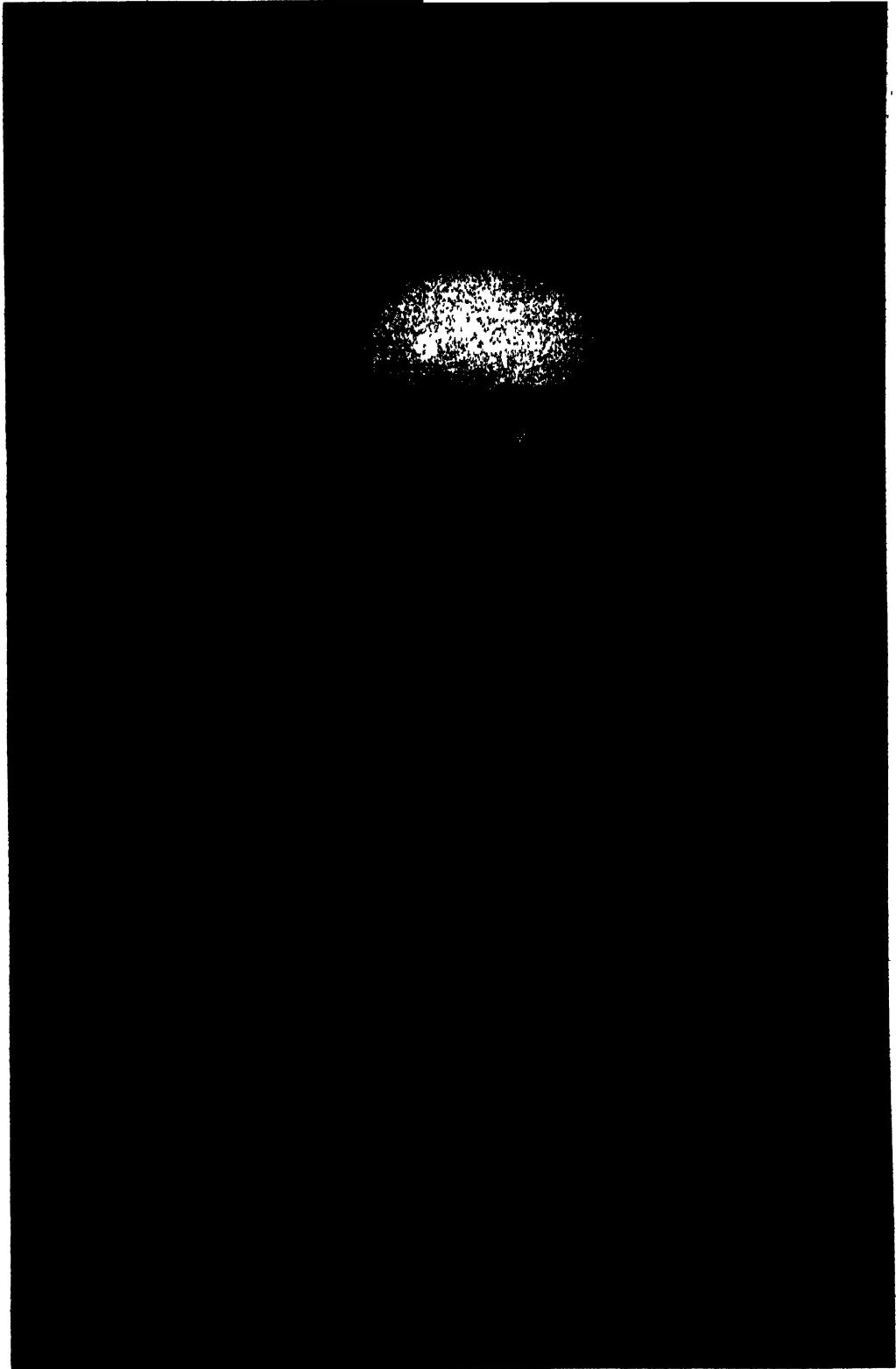
ical Seminary in 1873, and after further study at Leipzig (1873-6), held the pastorate of the Presbyterian Church at Norwood, N. J., in 1876-80. In 1895 he became professor of church history in New York University. He was assistant editor of Schaff's '*Bible Dictionary*' in 1878-80, associate and managing editor of the '*Encyclopædia of Religious Knowledge*' in 1880-4, and edited '*A Concise Dictionary of Religious Knowledge*' (1891). He also prepared the first important bibliography of foreign missions (1891), wrote '*Huldreich Zwingli*' (1901), the first original English biography of its subject, and was chosen secretary of the church history section of the American Historical Association.

Jackson, Sheldon, American educator: b. Minaville, N. Y., 18 May 1834. He was graduated at Union College in 1855, at Princeton Theological Seminary in 1858; was ordained to the ministry of the Presbyterian Church in the latter year; and was missionary to Western Wisconsin and Southern Minnesota in 1859-69. In 1869-82 he was superintendent of Presbyterian missions in western Iowa, Nebraska, the Rocky Mountain territories, Wyoming, Colorado, New Mexico, Arizona, Utah, and Montana, and from 1877 in Alaska. In 1885 he became United States general agent of education in Alaska, and in 1887 organized the Alaskan society of natural history and ethnology at Sitka. He aided in founding a Christian college in Utah in 1896, was moderator of the Presbyterian General Assembly in 1897, and wrote: '*Alaska and Missions on the North Pacific Coast*' (1880); '*Education in Alaska*' (1881); annual reports on '*Education in Alaska*' from 1886; and annual reports on the '*Introduction of Domestic Reindeer into Alaska*' (1891-1901).

Jackson, Stonewall. See JACKSON, THOMAS JONATHAN.

Jackson, Thomas Graham, English architect: b. Hampstead 21 Dec. 1835. He was educated at Oxford University and became the pupil of Sir George Gilbert Scott (q.v.) (1858-61), making a specialty of the Gothic style. He has designed most of the new buildings in Oxford, Cambridge, Eton, Westminster School, Rugby, Harrow, etc., and has restored Great Malvern Priory and Bath Abbey, besides building many new Gothic churches. He has written: '*Modern Gothic Architecture*' (1873); '*Wadham College, Oxford: its History and Buildings*' (1893); '*The Church of St. Mary the Virgin, Oxford: its History and Architecture*'.

Jackson, Thomas Jonathan, commonly called '*STONEWALL JACKSON*', American general: b. Clarksburg, Harrison County, Va., 21 Jan. 1824; d. near Chancellorsville, Va., 10 May 1863. Lieutenant-General Thomas Jonathan Jackson was one of the most unique, romantic characters of the War between the States, and crowded into the two years in which he served more brilliant achievements which won him wider fame than any other soldier on either side. Descended from Scotch-Irish stock and inheriting many of the qualities of his ancestry, he was left a penniless orphan when three years old, and soon showed "the stuff of which heroes are made," in his manly self-reliant efforts to



GEN. THOMAS J. (“STONEWALL”) JACKSON

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support himself. Learning of a vacancy from his Congressional District in the military academy at West Point, he determined to make the journey to Washington and seek the appointment, and set out at once—traveling a part of the way on foot—appearing before the member of Congress from his district in his suit of homespun, and with his leathern saddlebags over his shoulders. The Congressman presented him to the secretary of war, who was so much pleased with the youth's determination that he at once made out his appointment to West Point. He was very badly prepared to enter the academy and barely "squeezed through" on his entrance examination, but by persevering work he gradually rose in his grade until in July 1846 he was graduated No. 17 in a brilliant class containing such men as McClellan, Foster, Reno, Stoneman, Couch, Gibbon, A. P. Hill, Pickett, Maury, D. R. Jones, Wilcox, and others; and one who knew him intimately expressed the confident belief that if the course had been longer "Old Jack" would have graduated at the head of his class. He immediately reported for duty in Mexico, and serving in the artillery won distinction on every field, always seeking the post of danger, being made first lieutenant at the siege of Vera Cruz, brevetted captain at Contreras and Churubusco, and major at Chapultepec, rising to this rank in seven months, and being promoted more rapidly than any other officer of his grade in the Mexican War. He was frequently and honorably mentioned in the official reports, and John B. Magruder, his immediate superior, wrote of him: "If devotion, industry, talent, and gallantry are the highest qualities of a soldier, then he is entitled to the distinction which their possession confers." In the City of Mexico, after its capture and occupation, he had under the influence of that earnest Christian soldier, Colonel Taylor, become deeply concerned on the subject of personal religion and made a profession of faith in the Lord Jesus Christ. At West Point he had adopted as his motto: "You may be whatever you resolve to be," and now he added to this motto the saying of the great Apostle: "I can do all things through Christ which strengtheneth me." These two mottoes were the keynotes of his life and led the penniless orphan boy to become one of the immortals.

On the earnest recommendation of his old comrade, D. H. Hill, whose brother-in-law he afterward became, Jackson was elected, in 1851, professor of natural science and instructor of military tactics in the Virginia Military Institute, Lexington, Va., being elected over McClellan, Reno, Rosecrans, and G. W. Smith, whose names were submitted by the faculty at West Point. He made little reputation as a professor, for while thoroughly acquainted with his subject he lacked that "aptness to teach" so essential to a successful teacher, and the cadets were always playing pranks upon him, and laughing at his eccentricities. But he became one of the most consecrated active members of the Presbyterian Church, and left his impress as a Christian upon the community. From his habit of instructing his own servants in Scripture lessons every Sunday afternoon grew his famous negro Sunday school to which he devoted so much time and thought, to which he contributed so liberally of his moderate means,—sending his pastor checks for it in the

midst of his most active campaigns,—and which made such an impress upon the negroes and gave Jackson so warm a place in their affections that the first contribution to his monument was made in 1887 by the negro Baptist Church of Lexington. Jackson was a Union man, opposed to secession as a remedy for Southern wrongs, though thoroughly believing in the abstract right of a State to secede, and greatly deprecated the war which he predicted would follow; but when the news reached the quiet little town of Lexington that Mr. Lincoln had called for 75,000 troops to coerce sovereign States, and that the Union Convention of Virginia had passed an ordinance of secession, Jackson said in a speech before a public meeting: "I have longed to preserve the Union and would have been willing to sacrifice much to that end. But now that the North has chosen to inaugurate war against us, I am in favor of meeting her by drawing the sword and throwing away the scabbard." Governor Letcher, his old neighbor and friend, who had a high estimate of his abilities, commissioned him colonel in the Virginia forces; but his brilliant record in Mexico had been forgotten—he was only thought of as the quiet, eccentric professor, and when his name was presented to the Virginia convention, a prominent member arose and asked: "Who is this Major Jackson, anyway?" and it required all the eloquence of the Rockbridge delegates to secure his confirmation.

Marching the corps of cadets to Richmond where he remained for a brief season assisting in organizing and drilling the raw recruits in the "Camp of Instruction," he was ordered to Harper's Ferry on 3 May, where the skill he showed in reducing the high-spirited rabble who had rushed to the front at the first sound of the bugle to the respectable Army of the Shenandoah, which he turned over to the command of General J. E. Johnston 23 May, showed clearly that he was a soldier. Placed in command of the Virginia brigade which afterward became so famous, he met the advance of General Patterson at Falling Waters on 2 July, gave them a decided check, and captured a number of prisoners. Soon after he received his commission as brigadier-general in the following characteristic letter from General Lee:

RICHMOND, 3rd July, 1861.

MY DEAR GENERAL:—I have the pleasure of sending you a commission of brigadier-general in the Provisional Army; and to feel you merit it. May your advancement increase your usefulness to the State.

Very truly,

R. E. LEE.

But it was in the battle of first Manassas (Bull Run) that Jackson won his new name and fame, and the ringing words of the gallant Bee: "There stands Jackson like a stone wall," changed the name of "Thomas Jonathan" into the immortal "Stonewall" Jackson. He was wounded in the hand but refused to leave the field, and while the surgeons were dressing his wounds President Davis rode on the field, and Jackson, pushing aside the surgeons, tossed his cadet cap in the air and exclaimed: "Hurrah for the President. Give me ten thousand men and I will be in Washington to-night!" In September he was made major-general, and was sent on 4 October to command the "Valley District" and enter in the early part of 1862

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on that famous "Valley Campaign," which is now studied in military academies in Europe as illustrative of able strategy, rapid movements, and heroic fighting. In March he fell back before Banks' army of 35,000 men, and Banks reported him "in full retreat from the valley" and started a column to cross the mountains and attack Johnston in flank as he was falling back from Manassas, when Jackson suddenly turned, marched 18 miles in the morning, and with 2,700 men fought at Kernstown, near Winchester, 8,000 of the enemy, and though sustaining the only defeat that ever befell him he accomplished his purpose in recalling the column which was moving on Johnston's flank, quietly moved up the valley and took a strong position in Swift Run Gap from which he could easily defend himself or strike the enemy if he attempted to move on Staunton. Ewell's division coming to take his place, he left this grim soldier to watch Banks, and moved so secretly that neither friend nor foe had divined his plans until he thrilled the Confederacy and sent terror to the North by the following laconic and characteristic despatch:

Valley District, May 9th, 1862.

GEN. S. COOPER:—God blessed our arms with victory
at McDowell yesterday.

T. J. JACKSON, Major-General.

He had defeated the advance of Fremont under Milroy and driven it back in great confusion. Then followed in rapid succession the uniting of Ewell's division with his at Luray, the driving in of Banks' flank at Front Royal, the cutting of his retreating column at Middletown, and on 25 May the rout of Banks' army from the heights of Winchester, and driving him pell-mell across the Potomac. He was about to cross the Potomac into Maryland in pursuit of Banks when he learned that Fremont from the West, and Shields, the head of McDowell's column, from the East, were marching to form a junction in his rear at Strasburg. He at once put his army in motion and by forced marches (one of his brigades marched 52 miles in one day) he reached the point of danger in time to hold Fremont in check with one hand and Shields with the other until his whole army, prisoners, and immense wagon trains loaded with captured stores passed on in safety. He then moved leisurely up the valley, burning the bridges over the Shenandoah to prevent a junction between Fremont and Shields—his rear being protected by that chivalrous knight and brave soldier, General Turner Ashby, who filled the valley with the fame of his brilliant achievements, and whose fall in a severe fight near Harrisonburg on 6 June was sadly lamented as a great calamity to the Confederate cause. On 7 June, at Cross Keys, Ewell badly defeated Fremont, and on 8 June, at Port Republic, on the opposite side of the river, Jackson routed Shields, and the armies sent to "crush" him were soon rapidly retreating down the valley, while "Stonewall"—that name will cling to him, but "Thunderbolt," "Tornado," or "Hurricane," would be more expressive of his character,—remained master of the situation. This campaign may be thus summarized: In 32 days Jackson and his "foot cavalry" had marched nearly 400 miles, skirmishing almost daily, fought five battles, defeated three armies, two of which were completely routed, captured 20 pieces of artillery, 4,000 prisoners, and immense

quantities of stores of all kinds, and had done all this with a loss of fewer than 1,000 men killed, wounded, and missing, and with a force of only 15,000 men, while there were at least 60,000 men opposed to him. He had spread consternation throughout the North and had neutralized McDowell's 40,000 men at Fredericksburg, who were about to march to the aid of McClellan in investing Richmond. Jackson now rested for a brief season, was reinforced from Lee's army, made the impression on the enemy that he would advance down the valley again, and managed matters so secretly that Banks at Strasburg was busily engaged in fortifying against an expected attack from him at the very time he was thundering on McClellan's flank at Richmond over 200 miles away. The part he bore in the Seven Days around Richmond, the second Manassas campaign, and the Maryland campaign was so conspicuous and so important that it would be, indeed, to write the history of the army to give it in detail. His skill and daring in the Seven Days battles, his defeat of Pope's advance under Banks at Cedar Run, his flank march to Pope's rear, and the pertinacity with which he held him at bay along the Warrenton road until Lee could come up with Longstreet and drive him into the fortifications around Washington, his capture of Harper's Ferry with 11,000 prisoners, 13,000 stand of small arms, 73 pieces of artillery, and large quantities of provisions and stores of every description, and his conduct on the field of Sharpsburg, all added greatly to the fame of Stonewall Jackson and his grand old corps of "Foot Cavalry." It was the privilege of the writer of this sketch to be under Jackson during the whole of his brilliant career, and it may not be amiss to describe him as he appeared at the head of his victorious legions: About 37 years old, six feet high, medium size, gray-blue eyes, light brown hair, a rough mouth, iron jaw, and nostrils as big as a horse's. He wore a plain gray uniform which soon became faded and soiled, cavalry boots, and an old gray cadet cap with its rim tilting on his nose. He rode a raw-boned sorrel horse which the men said "could not run except toward the enemy," but whenever he appeared among the troops they would begin to give the Confederate yell, and he would take off his cap, put spurs to "Little Sorrel" and gallop away from them as rapidly as possible. This was so well understood that, when cheering was heard, some soldier would say: "There comes old Stonewall, or an old hare, one," and it was said that "the appearance of those personages never failed to elicit the genuine old Confederate yell." On 10 Oct. 1862 he was made lieutenant-general, and his corps made to consist of his old division, under W. B. Taliaferro, Early's division, A. P. Hill's division, and D. H. Hill's division, Colonel Brown's regiment of artillery, and numerous light batteries. At Fredericksburg, 13 Dec. 1862, he held the extreme right of Lee's army, and defeated with great slaughter Franklin's attack upon him. The following winter and spring Jackson spent in improving the organization, discipline, and efficiency of his corps, and as, in his judgment, a most important means of accomplishing this, he labored to have chaplains in every regiment and missionaries to visit the army, and did everything in his power to promote the religious welfare of his soldiers. It was largely through

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his influence that a chaplains' association was formed, and he had regular prayer-meetings at his headquarters during the weeks and preaching on Sundays. One of the most impressive scenes ever witnessed was one of these preaching services at Jackson's headquarters, where would be gathered from 2,000 to 3,000 soldiers, among whom might be seen R. E. Lee, R. S. Ewell, A. P. Hill, J. A. Early, R. E. Rodes, J. B. Gordon, J. E. B. Stuart, Taliaferro, Battle, Heth, Wilcox, Pender, and many other generals and colonels, and other field, staff, and company officers,—the rough garb of the private soldier mingling with the bars and stars, and wreaths of rank,—and prominent in the crowd "Old Stonewall" himself "playing sexton" in seeing the crowd seated, and profoundly interested in the services.

A man of prayer, a student of God's word, an implicit believer in the promises of the Bible, in an overruling Providence, a consecrated, humble, active Christian, he was, indeed, "a living epistle, known and read of all men," and eternity alone will reveal how far the great revivals in Lee's army, through which over 15,000 of the soldiers were brought to profess faith in Christ, were in answer to the prayers, and in blessing upon the labors of this great "Soldier of the Cross," as well as soldier of his country. But the end hastened on, General Hooker threw Sedgwick across the river below Fredericksburg the latter days of April 1863, crossed the bulk of his army above and strongly fortified his lines at Chancellorsville in the confident hope that Lee would either retreat on Richmond, or attack him in his strong position, where a crushing defeat would await him. But instead of doing either of these things Lee left Early to watch Sedgwick, moved up to Hooker's front, and sent Jackson with 22,000 men to make a march to Hooker's flank and rear. This was brilliantly executed and Jackson routed that flank of Hooker's army, and was proceeding to cut him off from his line of retreat and take a position where Hooker would have been compelled to attack him, when in returning from one of those bold reconnoisseances which he so frequently made, his party was mistaken for the enemy and fired on by his own men and he was very severely wounded. His left arm was amputated, his other wounds dressed, and he was doing well and gave every promise of recovery, when pneumonia, brought on by exposure before the battle, set in and he died at a quarter past three P.M., Sunday, 10 May 1863.

Calm, peaceful, trustful, in his lucid hours he talked cheerfully of his approaching end,—said that it would be "infinite gain to be translated and be with Jesus," and that "it was all right," and that he would have his cherished wish in dying on Sunday,—then his mind wandered to the battle-field and he exclaimed: "Tell A. P. Hill to prepare for action." "Pass the infantry rapidly to the front!" "Tell Major Hawks —," and then with a sweet smile, he said: "Let us cross over the river and rest under the shade of the trees!" The great soldier had fought his last battle, won his last victory, and gone to wear his glittering "crown of rejoicing." He was buried as he had requested, in "Lexington in the valley of Virginia;" a beautiful bronze statue marks his grave; on the hill at the Virginia Military Insti-

tute has been reared the stately "Jackson Memorial Hall," and in the capitol square of his native State stands the noble bronze statue, the gift of English admirers. Lee spoke his fittest eulogy when he wrote him after hearing that he was wounded: "Could I have dictated events I should have chosen for the good of the country to have been disabled in your stead." The American and the English press have written him down as one of the greatest soldiers of history, and other nations have endorsed these estimates, while future generations will tell to their children the story of Jackson's life and hold up for their example and imitation the penniless orphan boy who became one of the immortals.

J. WM. JONES,
Author and Lecturer.

Jackson, William Hicks, American soldier and stockman: b. Paris, Tenn., 7 Oct. 1836; d. Nashville, Tenn., 30 March 1903. He was graduated from West Point in 1856, was on frontier duty in the mounted riflemen in 1857-61, resigned from the service in 1861, entered the Confederate army as captain of artillery, and rose to be brigadier-general. Subsequent to the war he was proprietor of the Belle Meade stock-farm, near Nashville, Tenn., which sent to the races some of the greatest running horses of the American turf. He was president of the National Agricultural Congress, and high in the councils of the southern Democracy.

Jackson, Mich., city, county-seat of Jackson County; on the Grand River, and on the Lake Shore & M. S., the Cincinnati N., the Michigan C., and the Grand T. R.R.'s; about 35 miles south of Lansing and 72 miles west of Detroit. The first permanent settlement was made in 1829, and for some years it was the trade centre for a number of the large lumbering camps and for the scantily settled country in Jackson and the adjoining counties. After the Michigan Central railroad was put through the southern part of the State, in 1841, Jackson grew rapidly, and in 1857 it was chartered as a city. The country around is a rich agricultural region, noted for its fruits, grains, and vegetables. Coal and clay, the latter useful for pottery, are found nearby. The chief manufactures are flour, paper, machine-shop products, corsets, wagons, carriages, foundry products, agricultural implements, bricks, and sewer-pipe. Its trade consists principally in agricultural products, articles from the local industrial establishments, and in reaping and mowing machines, goods for clothing, and groceries. The car shops of the Michigan Central railroad are in Jackson. The city owns and operates the waterworks. Its rapid growth is due, to a large extent, to the development of its manufacturing industries. Pop. (1890) 20,798; (1900) 25,180.

Jackson, Miss., capital of the State, county-seat of Hinds County; on the Pearl River, and on the Yazoo & M. V., the Illinois C., and the Alabama & V. R.R.'s; about 40 miles east of Vicksburg, on the Mississippi. The first permanent settlement was made in 1828, or 1829, and it was incorporated in 1840. In 1863 it was occupied for some time by Union forces under Gen. Grant, and the ruins of the fortifications erected at the siege are still in existence.

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The city was nearly destroyed in 1864, by Gen. Sherman.

Jackson is situated in an agricultural region in which a large amount of cotton is raised. It is the commercial centre for a large section. The good railroad facilities and the advantage of traffic on the Pearl River are stimulating the increase of marketable agricultural and manufactured products. The chief industrial establishments are cottonseed-oil mills, fertilizer factories, sash, door, and blind factories, foundries, brick-yards, a cotton-compress, a plow and harrow factory, a broom factory and cooper shops. Some of the principal public buildings are the State capitol, State charitable institutions for the blind, insane, deaf and dumb, the State library, and the James Observatory. Among the private educational institutions of learning are the Millsaps College, founded in 1892 under the auspices of the Methodist Episcopal Church; and the Bellhaven College for young ladies. Pop. (1890) 5,920; (1900) 7,816; (1903) 12,000.

Jackson, Ohio, city, county-seat of Jackson County; on Salt Creek, and on branches of the Baltimore & O. S. W., the Hocking V., and the Ohio S. W. R.R.'s; about 100 miles east of Cincinnati and 70 miles southeast of Columbus. Jackson is located in the vicinity of the early routes of travel from the Ohio River to the interior of what is now the State of Ohio, and on to the Great Lakes. The first permanent settlement was made in 1795, but it was not incorporated until 1847, several years after the limits of Ohio were decided. It is situated in a coal and iron mining section, but there is a large amount of good farming land in the vicinity. The chief industrial establishments of the city are foundries, machine-shops, furnaces, woolen-mills, a tannery, and lumber-yards. The coal and iron ore-mining of the vicinity contributes largely to the industrial wealth of the city. Pop. (1900) 4,672.

Jackson, Tenn., city and county-seat of Madison County, situated about 80 miles northeast of Memphis, on the South Fork of the Forked Deer River, and on the Illinois C., Mobile & O., and Nashville, C. & St. L. R.R.'s. It is the trade centre of a large and fruitful agricultural region, is an important cotton market, and has manufactures of engines and boilers, cotton goods, lumber, machinery, flour, cottonseed-oil, furniture, trunks, spokes and skewers, plows, carriages, bricks, and other products. Here are located the Southwestern Baptist University, the Memphis Conference Female Institute, and Lane University. Jackson has a fine park, Carnegie Library, and modern municipal improvements, the waterworks and electric-light system being owned by the city. It has five banks with a combined capital of \$400,000. The government is by mayor and a council of eight aldermen. Jackson was first settled in 1818. Pop. (1900) 14,511.

During the Civil War Jackson was at times the headquarters of Gen. Grant. It was captured by Union troops 7 June 1862. On 19 Dec. 1862, Gen. Forrest sent detachments of cavalry to destroy the railroad to the north and south, and with 400 men advanced on Jackson and had a running fight with two regiments of Union infantry and detachments of cavalry under Col. Engelmann of the 43d

Illinois, who disputed Forrest's advance until the fortifications of the town were reached, when Forrest withdrew and moved on Humboldt and Trenton. On 13 July 1863, a Confederate cavalry force held the town and guarded a large number of conscripts. Col. Edward Hatch with 1,160 men of the 3d Michigan, 2d Iowa, 1st West Tennessee, and 9th Illinois cavalry regiments attacked the Confederates and drove them from the town, releasing about 450 conscripts, and capturing 250 horses and nearly 400 stand of small arms. Hatch's loss was very slight. The Confederates had 38 killed and about 150 wounded. Consult: 'Official Records,' Vol. XXIII.

Jackson (Miss.), Battle of. After the battle of Raymond (q.v.), 12 May 1863, Gen. Grant, having provided for the safety of his rear and left from the direction of Vicksburg, turned McPherson's and Sherman's corps and part of McClelland's on Jackson, 12 miles northeast of Raymond, to capture the place without delay. On the 13th McPherson moved from Raymond to Clinton, and then turned east on Jackson. Sherman moved through Raymond to Mississippi Springs on the 13th, and that night arranged with McPherson that both columns should arrive at Jackson about the same hour next day. McClelland closed up to Raymond and sent one division to Clinton to support McPherson. Gen. J. E. Johnston had arrived at Jackson on the evening of the 13th and, hearing next morning of the Union approach on the Raymond and Clinton roads, ordered Gregg's brigade to take position on the first-named road, and Walker's brigade on the latter, with instructions to each to delay the Union advance as long as possible, to give time for the removal of public property from the city. The combined strength of Gregg and Walker was about 6,000 men. About 9 A.M. of the 14th McPherson's advance on the Clinton road came upon Walker's pickets and drove them back upon the main body, posted in works on the crest of a semi-circular ridge 2½ miles west of Jackson, the front covered by a marshy creek lined with dense willows, and artillery commanding the bridge over the creek. At the end of nearly two hours Crocker's division of three brigades was deployed in line, with one brigade of Logan's in reserve. At 11 A.M. the skirmishers advanced to the creek and were checked, upon which the entire division went forward, drove in Walker's skirmishers, and advanced over the open ground beyond the creek, meeting a stout resistance; but Walker's men soon retreated, abandoning seven guns. They were pushed more than a mile by Crocker; but his men fell into some disorder, and were finally brought to a stand by artillery posted in an inner line of works close to the town. While Crocker was reforming, Walker made his escape to the Canton road. Crocker's loss was 265 killed and wounded. On the Raymond road Sherman encountered Gregg and, by a flank movement, compelled him to abandon his entire line and ten guns, with the loss of nearly 200 prisoners and 81 in killed and wounded. Sherman's loss was 32. Johnston retreated northward on the Canton road. McPherson and Sherman entered Jackson between 3 and 4 P.M.; Sherman was left in the city to destroy the railroads, bridges, factories, arsenals, and everything valuable. On the morn-

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ing of 15th Grant turned the rest of his army west, defeated Pemberton at the battle of Champion's Hill (q.v.) on the 16th, drove him across the Big Black on the 17th, and began the siege of Vicksburg. The Union loss at Jackson was 42 killed, and 251 wounded. The Confederates make their loss less than 400, but Sherman estimated it at 845 killed, wounded and missing. Consult: 'Official Records,' Vol. XXIV.; Johnston, 'Narrative'; Sherman, 'Memoirs,' Vol. I.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. III.

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Jackson, Siege of. The battle of Jackson (q.v.), 14 May, 1863, was followed by the movement of Gen. Johnston northwest, with Gregg's and Walker's brigades, to form a junction with Pemberton, who had been directed to join him; but early on the 19th he received word from Pemberton that he had decided to hold Vicksburg instead, upon which Johnston marched his troops to Canton. He was reinforced, and 29 June he marched west to operate in the rear of Grant, who was besieging Vicksburg. He was about to move on the morning of 5 July to the south of the Vicksburg and Jackson Railroad, when he heard that Vicksburg had fallen, whereupon he fell back to Jackson and occupied a line of works covering the town, with both flanks on Pearl River. Gen. Sherman had been held in readiness to move back and drive the Confederates from the State, and when Vicksburg fell he moved promptly with his own corps and those of Gen. Ord and Parke, crossed the Big Black at three different points, and by 11 July was close up to Johnston's works and shelling the city with nearly 100 guns. Ord's Thirteenth corps was on the right, the Fifteenth corps in the centre, and Parke's Ninth corps on the left. On the 12th the fire of the artillery was increased, reaching every part of the town, and Lauman's division of Ord's corps, moving in dense woods, came too close to the Confederate works, was struck in flank and driven back in disorder, losing over 500 men killed, wounded, and captured, together with the colors of three regiments. The siege was prosecuted night and day, and on the morning of the 17th Jackson was found evacuated, Johnston having retreated on the road to Brandon, and thence to Morton, where he arrived on the 20th. Steele's division pursued Johnston as far as Brandon, 14 miles from Jackson; Sherman remained five days at Jackson, destroying much property of every description, and then returned to Vicksburg. The Union loss at Jackson, 11–16 July, was 129 killed, 762 wounded, and 231 missing or captured. The Confederate loss, 5–25 July, was 71 killed, 504 wounded, and 764 captured or missing. Consult: 'Official Records,' Vol. XXIV.; Johnston, 'Narrative'; Grant, 'Memoirs,' Vol. I.; Sherman, 'Memoirs,' Vol. I.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. III.

E. A. CARMAN.

Jacksonville, Fla., one of the most important and rapidly growing ports of the southeastern United States; chief city of the State, and seat of Duval County in the northeastern corner; on the west bank of the St. John's, 24 miles from the ocean by water, 14 direct. It is one of the chief southern railroad centres, six important lines converging there, three of them great trunk lines: the Southern, Seaboard Air

Line, Atlantic Coast Line, Georgia Southern & Florida, Florida East Coast, and Jacksonville & Southwestern. It is 138 miles south of Savannah, 212 north of Tampa, and 165 east of Tallahassee; and about 1,000 from New York, with train service of 25 to 28 hours. It is also connected with all the Atlantic coast cities by the Clyde, Mallory, and Ocean Steamship lines; and with the picturesque St. John's and its tributaries by six daily and tri-weekly lines of steamers. The fascinating rivers, lakes, Everglades, etc., of Florida, the best hunting and fishing grounds east of the Mississippi, with Jacksonville's mild and healing winter and even summer climate, make it one of the leading tourist resorts in the country, some 50,000 to 60,000 stopping annually at its numerous large and well-equipped hotels.

Jacksonville's position makes it the business key and metropolis of the peninsula, the great shipping point for Florida's exports, and the distributing point for its purchases. Of the former, the chief are lumber, shingles, and ties, mainly yellow pine from the great Florida forests, to nearly \$2,000,000 a year; next come naval stores — turpentine, rosin, and rosin oil — of over \$1,000,000, and rapidly increasing, a company with \$3,000,000 capital having been recently organized for it; cotton has also risen to over \$600,000 a year; and an extremely heavy element is the shipping of fruit — oranges, pineapples, and a great diversity of tropic fruits, for which see FLORIDA — and garden vegetables to the North. In a suburb of the city is the largest ostrich farm in the United States, and the only one east of California, whose products form part of the shipments; these also include great quantities of phosphates and fertilizers, and kaolin. As a jobbing centre for interior trade, it has the immense advantage of having practically no competitor in the State, and is rapidly becoming one of the foremost in the South; there are 19 large wholesale grocery houses alone, and the freight entries of grain, hay, and milled products amounted in 1900 to over \$12,000,000. Its gross annual trade exceeds \$75,000,000. This business implies large banking facilities; and there are now two national and three State banks in the city, besides a savings bank, with over \$1,100,000 of capital and undivided profits.

In manufacturing, Jacksonville's chief specialty is lumber and timber products, which in 1900 amounted to nearly a third of the entire output of \$2,312,300; there are ten large saw and planing mills. Of the other industries, the most considerable was the manufacture of ice, five establishments producing \$87,647 worth; a witness to the needs of thronging tourists in a warm climate. But there were also foundry and other iron products, steam engineering works, brick and tile, paving and roofing materials, wooden ship and boat building, carriages, saddlery, mattresses and palmetto fibre products, pulp, patent medicines, confectionery, cigars, and other articles. There are about 200 different establishments in all.

As a port, it has long been hampered by shoals in the river, and the bar outside the St. Johns. The river is a magnificent estuary, a mile wide for many miles up, and with a channel deep enough for the largest ocean vessels; but it

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was not until 1896, by combined government and local efforts, that a channel 19 feet deep was obtained from Jacksonville to the ocean, admitting vessels of 3,800 tons. The National government, at last, in 1901, appropriated \$1,300,000 to deepen it to 24 feet all the way, by a permanent system of jetties and dredging. It has over seven miles of water front. The city, 7.6 square miles in area, is handsomely laid out, and its business section is almost entirely new, having been practically obliterated by a fire on 3 May 1901, which destroyed 148 blocks, covering 455 acres and including 2,361 buildings, a property loss of over \$15,000,000. With astonishing energy up to 25 Oct. 1903, 3,361 new buildings had been erected, 1,000 more than were destroyed, and greatly improved ones. Among the finest buildings are the Union station, United States post-office and custom-house, Masonic Temple, St. Luke's hospital, National Bank of Jacksonville (which were spared by the fire). Among the public buildings since erected are the Windsor hotel, Seminole, Elks, Woman's and Wheelmen's club-houses, Mercantile Exchange Bank, Board of Trade, and Duval High School. A \$50,000 Carnegie free library is being erected. The religious denominations have built a number of fine churches, costing from \$25,000 to \$100,000 each. Notable among them are the Congregational, Baptist, Christian, McTieire Memorial (M. E. South), Snyder Memorial (M. E.), Presbyterian, St. John's Episcopal, Church of Good Shepherd, Episcopal, and three fine colored churches. There are five parks of 57 acres in all, "Hemming" having a Confederate monument; and 14 miles of shell streets and drives, besides a general macadamizing of paving with vitrified brick. The ocean beaches, 18 to 20 miles off, are among the finest on the Atlantic coast. The sanitation of the city is perfect. After the yellow fever epidemic of 1888 it installed a fine thorough system of sewerage, drained and filled in the swampy tracts around, and replaced the water supply with one almost chemically pure, drawn from artesian wells 500 to 1,000 feet deep. Its death rate has sunk to 10 in 1,000, one of the lowest in the country. There are 20 miles of trolley tracks, and the city owns electric-light works and waterworks; both light and water are extremely cheap. The finances of the city are in the best condition. It has never defaulted its bonds, which are for the waterworks and electric plant, and amount to \$1,368,000, payable 15 May 1904 at 5 per cent. There is no floating debt. The assessed valuation is \$15,000,000; tax 16.02 mills on the dollar, or 11 mills if beyond the hydrants. Jacksonville was settled in 1816 by Lewis Z. Hogans, whence Hogans' Creek, dividing the city, is named. In 1822 it was laid out and named after Andrew Jackson, the first territorial governor of Florida. It was incorporated in 1833. The Seminole War prevented its development, but it revived in 1842 and has grown steadily since. Its population in 1850 was 1,045, in 1860 2,118, in 1870 6,912, the war having been an immense gain instead of loss; 1880 7,650, 1890 17,201, 1900 28,429, of whom 16,271 or 57 per cent were colored. At present (1903) is over 35,000.

CHAS. H. SMITH,
Secretary Jacksonville Board of Trade.

Jacksonville, Ill., city, county-seat of Morgan County; situated on the Mauvaisterre Creek, a branch of the Illinois River, about 34 miles southwest of Springfield and 88 miles north of St. Louis, Mo.; on branches of the Wabash, the Chicago & A., the Burlington, the Chicago, P. & St. L., and the J. & St. L., the last of which is also a part of the Burlington system. Jacksonville was laid out as early as 1825, about seven years after the admission of the State of Illinois into the Union, established as a town in 1840, and incorporated as a city in 1867. It was made the county-seat of Morgan County in 1825. The origin of the name of the city is somewhat uncertain, but the most probable tradition seems to indicate that it was named in honor of Andrew Jackson, who was a prominent Presidential candidate at the time when the town was founded. Jacksonville is noted for its institutions of learning, its wide, prettily shaded streets, and its handsome residences. It is the seat of Illinois College, the oldest college in the State, founded through the efforts of local residents and a band of students from Yale College. Originally non-sectarian, the college has recently become Presbyterian, has absorbed the Jacksonville Female Academy, and become affiliated with the University of Chicago. Among the other institutions are: the Illinois Woman's College, established in 1847 under the auspices of the Methodist Episcopal Church; the State Central Hospital for the Insane; the State School for the Blind; the State School for the Deaf and Dumb; Our Saviour's Hospital, in charge of the Sisters of the Holy Cross; the Passavant Memorial Hospital; a Carnegie Free Public Library; the Conservatory of Music; and Whipple Academy, a preparatory school. The last two are connected with Illinois College. The city-hall, the court-house, and the high school are the most prominent public buildings. Besides these, there are numerous church edifices, the most attractive of which is the Westminster Presbyterian. The most important industrial establishments of the city are the woolen mills, and the car-shops of the Chicago, Peoria & St. Louis Railroad. Other manufactures include machine-shop products, bricks, candy, paper, and flour. The executive head of the city government is a mayor, who holds office for two years, and a city council composed of 12 members elected for two years by the four wards. The mayor appoints the administrative officials, subject to confirmation by the council. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 12,935; (1900) 15,078.

C. H. RAMMELKAMP,
Head of Department of History and Political Science, Illinois University.

Jacob (Heb. *Yaqôbh*, the supplanter), the son of Isaac, and the grandson of Abraham, the last of the Jewish patriarchs, and the real ancestor of the Jews. He died at the age of 147 years, about 1860 B.C., and was buried in the tomb of Abraham, before Mamre in Canaan.

Jacob Tome Institute, an institution of secondary education located at Port Deposit, Md. It was founded 1894 by Jacob Tome. When Mr. Tome's gift was made, only five other citizens of the United States—Stephen Girard, Anthony J. Drexel, Johns Hopkins,

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Charles Pratt, and John D. Rockefeller — had made greater gifts to educational institutions. The endowment and other property of the school are estimated at more than \$3,000,000. The Jacob Tome Institute was incorporated in 1889. The boarding school for boys, founded in 1900, is located on the hills overlooking the historic Susquehanna River. The grounds of the institute include about 160 acres. The principal buildings are Memorial Hall, erected in memory of the founder, two dormitories, gymnasium, the Inn, power plant, and infirmary. The school consists of six classes, each requiring one year. The studies of the last three years are arranged in five groups which prepare students for college, technical schools, or for active business life. The institute confers no degrees, although a certain amount of collegiate work can be and is done in the regular courses. Students must be not less than 10 years of age in order to gain admission. Special scholarships are offered to boys from Maryland. There is also a kindergarten, Junior School, and Senior School for girls.

Jacobi, ja-kō'bī, Abraham, American physician: b. Hartum, Westphalia, 6 May 1830. He was educated at the Universities of Greifswald, Göttingen, and Bonn, and was graduated as M.D. from the latter in 1851. Those were years of revolutionary ferment in Germany and Jacobi, becoming identified with the movement, was held in detention for "high treason" at Berlin and Cologne (1851-3). In 1853 he settled in practice in New York, where his abilities soon brought him into notice. He was appointed professor of diseases of children at the New York Medical College (1860-5) and held a similar chair in the medical department of the University of the City of New York (1865-70). Some years later he became professor of the diseases of children at the College of Physicians and Surgeons. He has held many important appointments and was president of the New York State Medical Society (1882) and of the New York Academy of Medicine (1885-9). In 1900 his 70th birthday was made the occasion of a public demonstration in his honor. Author: "Dentition and its Derangements"; "Infant Hygiene"; "Diphtheria"; "Therapeutics of Infancy and Childhood"; "Infant Diet".

Jacobi, Mary Putnam, American physician: b. London, England, 31 Aug. 1842. She was graduated from the New York College of Pharmacy in 1862, from the Woman's Medical College of Philadelphia in 1864, and from the Ecole de Médecine of Paris in 1871. She then entered practice in New York, in 1881 was appointed clinical professor of the diseases of children in the New York Post-Graduate Medical School, where she lectured for three years. In 1874 she established an association for the promotion of the medical education of women, and became its president. In 1873 she was married to Abraham Jacobi (q.v.). She became a member of the American Medical Association, and published several works, including: "The Value of Life" (1879); "Cold Pack and Anæmia" (1880); "The Prophylaxis of Insanity" (1881); "Common Sense Applied to Woman's Suffrage" (1894).

Jacobins, jāk'ō-bīnz, the most famous of the clubs of the first French Revolution. When

the States-General assembled at Versailles in 1789, it was formed and called the Club Bréton. On the removal of the court and national assembly to Paris it acquired importance and rapidly increased. It adopted the name of Société des Amis de la Constitution, but as it met in a hall of the former Jacobin convent in Paris, it was called the Jacobin Club. It gradually became the controlling power of the Revolution, and spread its influence over France, 1,200 branch societies being established before 1791, and obeying orders from the headquarters in Paris. The Jacobins were foremost in the insurrectionary movements of 20 June and 10 Aug. 1792; they originated the *commune de Paris*, and changed their former name to Les Amis de la Liberté et de l'Égalité. For a while they ruled supreme, and the Convention itself was but their tool. Robespierre was their most influential member; they ruled through him during the Reign of Terror, and were overthrown after his downfall in 1794. In that year the Convention forbade the affiliation of societies; the Jacobin Club was suspended and its hall was closed. The term Jacobin is now often used to designate anyone holding extreme views in politics.

Jac'obite Christians, a subdivision of the sect of the Monophysites (q.v.) comprising those who dwelt in Syria, Mesopotamia, and Babylonia, organized by a certain Jacobus Baradæus, in the reign of Justinian, somewhat later than the middle of the 6th century. Jacobus had been a monk whose poverty-stricken asceticism gained for him the title of Jacobus Baradai (Ragged James). He had been appointed bishop of Edessa in 541, and from that year to 578 he traveled round gathering the members of his heretical sect, until they formed a compactly ordered body which has survived to the present time. They now number about 80,000, and are governed by two so-called Patriarchs, one of Antioch, the other of Jerusalem.

Jac'obites, a party in Great Britain (so styled from Lat. *Jacobus*, James), who after the revolution in 1688 continued to be the adherents of the dethroned King James II. and his posterity. In Ireland they were soon put down by conquest. In England the revolution was accomplished with the apparent consent of all parties; but in a year or two the Jacobite party gained considerable influence, and continued to disturb the government of William throughout his reign. After the accession of Anne and the death of James their efforts slackened for a time; but toward the close of her reign they revived. Bolingbroke and Oxford, with others of the Tory ministers of Anne, were in treaty with the son of James II., and either really or pretendedly negotiated for a restoration. On the arrival of George I. in 1714 a rebellion broke out in Scotland, supported by a more insignificant rising in the north of England. The failure of both these movements damped the enthusiasm of the English Jacobites, but in Scotland the party maintained its influence until the unsuccessful rebellion of 1745 put an end to its political importance, though some ultra-Jacobites did not think themselves justified in transferring their allegiance to the house of Brunswick till the death of Cardinal York in 1807. The hopes and wishes of the

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Scottish Jacobites found expression in many beautiful songs, which form an interesting feature of the national literature.

Jacobs, Henry Eyster, American Lutheran clergyman and theologian: b. Gettysburg, Pa., 10 Nov. 1844. He was graduated from Pennsylvania College (Gettysburg) in 1862, from the Lutheran Theological Seminary at Gettysburg in 1865, was professor of Latin and history in Pennsylvania College in 1870-80, of ancient languages in 1880-1, and of Greek in 1881-3. In 1883 he became professor of systematic theology in the Lutheran Theological Seminary, and in 1894 dean of the faculty of that institution. His publications include: 'The Lutheran Movement in England' (1891); a 'History of the Lutheran Church in America' (1893); 'Elements of Religion' (1894); a 'Life of Martin Luther' (1898); and 'The German Emigration to America 1700-40' (1899).

Jacobs, Joseph, Anglo-American author and journalist: b. Sydney, New South Wales, 29 Aug. 1854. He was graduated from St. John's College, Cambridge, was at various times editor of 'Folk Lore,' the 'Literary Year-Book,' and the 'Jewish Year-Book,' was elected president of the Jewish Historical Society, and became literary editor of the 'Jewish Encyclopaedia.' In 1896 he lectured in the United States. His publications include, beside translations and editions of English classics: 'Celtic Fairy Tales' (1891); 'Indian Fairy Tales' (1892); 'The Jews of Angevin England' (1893); 'Studies in Biblical Archaeology' (1894); 'Literary Studies' (1895); and 'Jewish Ideals' (1896).

Jacobus, Melancthon Williams, American Presbyterian clergyman and educator: b. Allegheny, Pa., 15 Dec. 1855. He was graduated from Princeton in 1877, from the Princeton Theological Seminary in 1881, and after study at Göttingen and Berlin (1881-4), was pastor of the Presbyterian Church at Oxford, Pa., in 1884-91. In 1891 became professor of New Testament exegesis and criticism in the Hartford (Conn.) Theological Seminary. His Stone lectures at the Princeton Theological Seminary (1897-8) appeared as 'A Problem in New Testament Criticism' (1900).

Jacoby, Harold, American astronomer: b. New York 4 March 1865. On his graduation from Columbia University in 1885, he determined to apply himself to astronomical research, a subject in which he had always evinced interest, and he was appointed assistant astronomer United States eclipse expedition to West Africa (1889-90). He has been professor of astronomy at Columbia since 1894 and is an active member of the leading astronomical and scientific societies at home and abroad. He has written numerous technical monographs in astronomical photography, stellar parallax and star clusters which have been published by French, English and Russian societies. He has also been a frequent contributor to the periodical press on popular astronomy.

Jacotot, Jean Joseph, zhōn zhō-zéf zhā-kō-tō, French educator: b. Dijon 4 March 1770; d. Paris 30 July 1840. He was successively soldier, secretary to the minister of war, and deputy-director of the Polytechnic School,

where he was also professor of mathematics. He went to Brussels in 1815, in 1818 was appointed lecturer on the French language in the University of Louvain, and in 1827 director of the Military Normal School. The fundamental principle upon which his system of education rests is that every person is able to educate himself, provided he is once started in the right way. Knowledge should first be acquired through instinctive experience, or by the memory. For example, in imparting a knowledge of a language, Jacotot began by making the pupil commit to memory a single passage; he then encouraged him to study for himself, first the separate words, then the letters, then the grammar, and lastly the full meaning and import. His steps were learn, repeat, reflect, and verify. He expounded his views in 'Enseignement Universel' (1822). Consult: 'Life,' by A. Guillard (1860); Quick, 'Educational Reformers' (1868); Payne, 'Lectures on Education' (1892).

Jacquard, Joseph Marie, zhō-zéf mā-rē zhā-kár, French inventor: b. Lyons 7 July 1752; d. Oullins, near Lyons, 7 Aug. 1834. His parents were silk weavers, and he learned the same trade. After a long period of hardship, during which he shared in some of the campaigns of the Revolution, he made his name famous by the invention of his new loom, which was publicly exhibited in 1801. He endeavored to introduce it into general use in Lyons, but was mobbed, and all but lost his life. Ultimately, however, his invention was bought by the French government, and he was able to spend the latter part of his life in comfortable independence. The subsequent prosperity of Lyons is largely attributable to his invention, and a more enlightened generation erected a statue to him in 1840 on the very spot where his loom was publicly destroyed. See LOOM.

Jacquard Machine. See DAMASK MANUFACTURE.

Jacquerie, zhák-è-rē, the name given to the rising of the French peasantry in the 14th century after the battle of Poitiers. They committed great devastations and outrages—burning castles, murdering men and violating women—particularly in the northeast of France. They were at length quelled by the Captal de Buch and Gaston Phébus, count of Foix, who slaughtered 7,000 of them near Meaux. The term *Jacquerie* is derived from *Jacques Bonhomme*, a familiar epithet for a peasant.

Jade, a remarkably tough, compact, ornamental stone, of green to white color and vitreous lustre, used by the prehistoric peoples of Switzerland, Mexico, Alaska, and other countries for axes, utensils and carvings. It is still highly prized in the East, especially in China and New Zealand. Jade is a general term including two distinct minerals, jadeite and the more common nephrite. Jadeite belongs to the pyroxene group and chemically is a soda-silicate, easily fusible (at 2.5) and having a specific gravity of 3.3 to 3.35. Nephrite is a variety of amphibole identical with tremolite when of white color, or with actinolite when green, fusing much less easily (at 4) and with specific gravity of 2.95 to 3.0. Much information as to jade and implements made from it may be found

JADWIN — JAGUAR

in the publications of the Smithsonian Institution, especially a paper by S. Blondel, 'A Historical, Archæological and Literary Study of Jade,' in the annual report for 1876.

Jad'win, Edgar, American military engineer: b. Honesdale, Pa., 1865. He studied at Lafayette College, was graduated from West Point in 1890, was an assistant in government engineering in 1890-1 and again from 1893, in the Spanish-American War was successively major and lieutenant-colonel of the 3d United States volunteer engineers, and for a time commanded a battalion of this regiment in the sanitation of Matanzas, Cuba. Promoted captain in the corps of engineers, U. S. A. (1900), he was appointed (1902) to direct all Pacific coast fortification and river and harbor work south of San Francisco.

Jæger, yā'gēr. See GULL; SKUA.

Jaffa, jāffā or yāf'fā (ancient JOPPA; Ar. *Yafa*; Heb. *Yapho*, beauty), Asiatic Turkey, in the western part of Palestine on the Mediterranean Sea; about 35 miles from Jerusalem. Jaffa is an old Phœnician town mentioned in several places in the Bible. It was the port of entry for Jerusalem and for several of the interior cities of Palestine. Here the cedars from Lebanon were landed and then carried overland for the building of the Temple in Jerusalem. The house where Simon the tanner lived, and where Saint Peter lodged, is still pointed out. In 1187 it was taken by Saladin, in 1191 by Richard I. In 1799 it was captured by Napoleon, who here put to death 1,200 Turkish prisoners. The narrow entrance to the harbor is extremely dangerous. The city is built on a high rocky coast, and presents today the same irregular arrangement of streets, and unattractive looking houses that it may have had hundreds of years ago. The remains of Roman fortifications and dwellings are in the vicinity. The old road to Jerusalem is extremely interesting; but a railroad, built in 1892, connects the city with Jerusalem. The chief exports are oranges (said to be the finest in the world), other fruits, soap, sesame, wine, oil, raw silk, and nuts. The chief imports are sugar, rice, lumber, cotton goods, petroleum, tobacco, and silk goods. The city contains several mosques, a Franciscan monastery, and a mission school. Some attempts have been made to establish colonies of Jews on land near Jaffa. Pop. (1903) estimated, 30,000.

Jagannath, or Juggernaut (Sanskrit, *Jagan-nâtha*, lord of the world, one of the names of Vishnu), called by the natives Puri, a town and celebrated temple of Hindustan, in the presidency of Bengal, province of Orissa, on the Bay of Bengal, 48 miles south of Kattack. The town derives all its importance from the temple. This, the most celebrated shrine in Hindustan, was completed in the 12th century, at an enormous expense. The main street, at the extremity of which the temple stands, consists entirely of religious structures built of stone. The gardens here produce the finest fruits in the province. The temple stands near the shore, in a waste, sandy tract, and appears like a shapeless mass of stone. The idol is a carved block of wood, with a hideous face, painted black, and a distended blood-red mouth, and is magnificently

dressed. On festival days the throne of the image is placed on a high tower moving on wheels. Long ropes are attached to the tower, by which the people draw it along. The belief that devotees used to cast themselves headlong in front of this car to be crushed to death probably grew out of the accidental fatalities sometimes occurring. Every year pilgrims flock in crowds to the temple.

Jagersfontein (yā'gérz-fōn-tīn) **Excelsior, The**, a name given the largest known diamond; found in the mine of the Jagersfontein Company, Orange Free State, South Africa, in 1893; weight, 971 carats; color, blue white.

Jag'ger, Thomas Augustus, American Protestant Episcopal bishop: b. New York 2 June 1839. He was graduated from the General Theological Seminary, New York, and ordained deacon in the Protestant Episcopal Church 1860. While serving as rector of Holy Trinity parish, Philadelphia, Pa., he was elected to the newly formed diocese of Southern Ohio, and consecrated May 1875. He is the author of 'The Men of the Ages'; 'The Ministry of Phillips Brooks'; 'The Personality of Truth,' the Bohlen lectures for 1900.

Jaggery, a coarse brown sugar made in the East Indies by the evaporation of the juice of several species of palms, chemically the same as cane-sugar. The sap which yields jaggery becomes by fermentation palm-wine, and from it arrack (q.v.) is distilled. See PALM.

Jaguar, jäg'u-är or jäg'wär, a great American spotted cat (*Felis onca*), once numerous as far north and east as Arkansas, but since the early part of the 19th century rare even in Mexico. It resembles the leopard, but is more robust (exceeding the cougar in weight), has a rounder head, relatively shorter legs and a shorter, thicker tail. The tawny yellow hide is spotted with black, the spots larger than those of the leopard, and inclined to form broken rings with a spot in the centre. Jaguars abound in the tropical forests, especially along the great rivers, where they find most prey. They subsist largely on capybaras, agoutis, etc., but frequently pounce upon deer when they come down to drink. They seem to be more arboreal than most large cats, and a favorite method of obtaining their food is to lie along a tree-limb in some favorable spot and leap down upon the victim. But jaguars also abound in the treeless morasses of the Gran Chaco, and even on the dry uplands of Paraguay and Argentina, where their food and habits are entirely different from those who dwell in the forests. In view of the great extent of country and variety of circumstances in which this animal occurs, formal statements as to its habits are rarely more than locally true; and much error and superstition encumbers popular accounts. In general the jaguar has the manners and disposition of other great cats, changing with environment, season and circumstances. It submits grudgingly to captivity, and gives the same reluctant submission to the training of the circus as is exhibited by other great cats. In some regions it is greatly feared by the people, while in other places it is regarded as little to be feared. Its greatest peculiarity, perhaps, is the tendency to terrific roars and cries, more loud and continuous than those of cougars or leop-

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ards. Consult the works of South American travelers and naturalists, especially Humboldt, Azara, Walerton, Wallace, Bates, and W. H. Hudson. Their accounts are well summarized by Porter in 'Wild Beasts' (New York 1894).

Jaguarondi, jäg-wä-rön'di, or **Yaguarondi**, a slender, long-tailed, unspotted, blackish-gray wildcat (*Felis jaguarondi*) of tropical America. It is not common, and is little known. It measures about 30 inches from snout to tail, and the tail is 25 inches long; and the sides of its nose are curiously pinched in.

Jains, jinz, or **Jainas**, ji'näz, a Hindu religious sect, which in union with the Buddhists opposed Brahmanism. They are numerous in the great cities of western and northwestern India, as well as in the Dravidic states of the South. The name signifies a follower of Jina ("conqueror of the world"), one of the denominations of their apotheosized saints. They have many fine temples built in different parts of the Deccan, as well as elsewhere. The Jains deny the divine origin and infallible authority of the Vedas; they reverence certain holy mortals, now termed Tirthankara or saints, and they manifest extreme and even ludicrous tenderness for animal life. They positively affirm that the world exists from all eternity, not being created by God or any other being, and that it will exist forever. This world is divided into three parts—the upper, the middle, and the lower worlds. The Jains believe that not to kill any sentient being is the highest virtue; and lying, covetousness, theft, are strongly condemned. Not to eat at night, and to drink water strained (for fear of its containing any insect), not to drink arrack, are important injunctions. Various fruits and vegetables they will not eat even under the pressure of starvation, and any kind of flesh meat they will not touch with the hand. They believe in a sort of nirvâna (like the Buddhists). Those who attain to this nirvâna, this extinction of action, this final liberation, do not return to a worldly state, and there is no interruption to their bliss; they have perfect vision and knowledge, and do not depend upon works. The Jains are split up into two principal divisions, Digambaras and Svetâmbaras; the points of difference between them are said to comprehend a list of 700 topics, 84 of which are considered of paramount importance. The Digambara (sky-clad, naked) now wears colored garments, confining the disuse of clothes to meal hours; the Svetâmbara wears, as the name signifies, white garments. Both the parties have the same sacred books, which they style "angas," but no sacerdotal caste.

Jal'ap (so called from Jalapa, or Xalapa, Mex., whence it is imported), the tuberous roots of several plants of the order *Convolvulaceæ*, that of *Ipomaea purga* being the most important. This is a twining herbaceous plant with cordate leaves and deep pink flowers, growing naturally on the eastern declivities of the Mexican Andes, at from 5,000 to 8,000 feet. The jalap of commerce consists of irregular ovoid dark-brown roots, varying from the size of an egg to that of a hazel-nut. The drug is one of the most common purgatives, but is apt to produce griping and nausea.

Jalapa, hä-lä'pä, or **Xalapa** ("a place of water and sand"), Mexico, city, capital of the

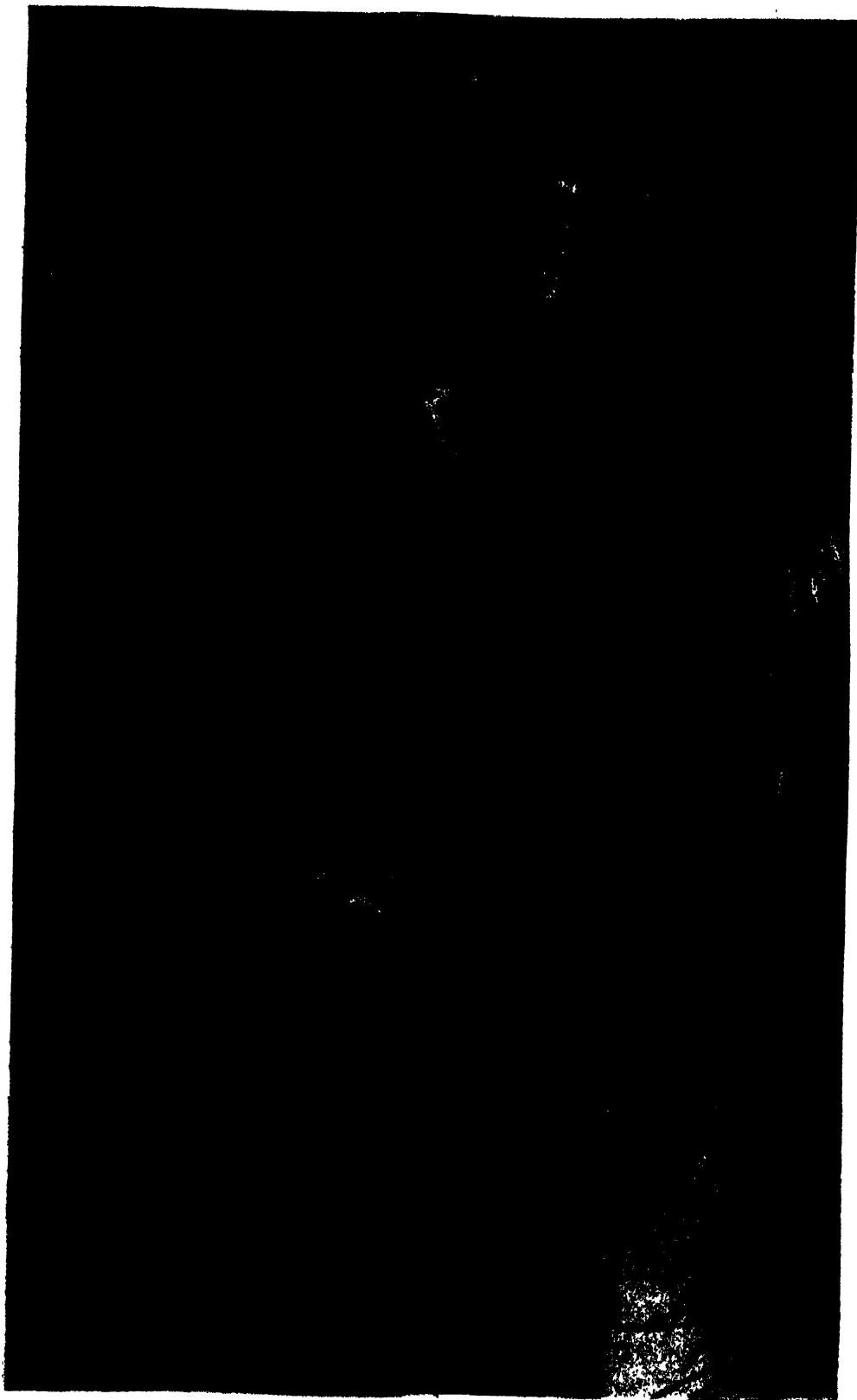
state of Vera Cruz; on the railroad which extends from the city of Vera Cruz across the state of Vera Cruz and Puebla; about 50 miles northwest of Vera Cruz. Jalapa is situated about 4,340 feet above the sea, at the base of the basaltic mountain, Cofre de Perote, which rises about 14,300 feet. Before the advent of railroads, the route from Vera Cruz to Mexico City was through Jalapa, which was then of considerable importance. It is a favorite mountain resort for the inhabitants along the coast and in the valleys. The irregularity of the streets, the gardens which surrounded the city, the well-built houses, the parks, and promenades, all make the place most attractive. It was once the capital of the state. It is one of the oldest cities on the continent; one of its churches is said to have been built by Cortes, who found here an Indian town. The Franciscan convent was built in 1556. The great annual fair held here between the years 1720-77 made Jalapa a place of note. People came from far and near to see and purchase goods brought from Europe, mostly from Cadiz. In the city there are three hospitals, a number of good schools, and several fine church buildings. Pop. (1903) 20,500.

Jalisco, hä-lës'kō, Mexico, a state bounded on the west by the Pacific Ocean, and on the north, east, and south by the states of Durango, Zacatecas, Aguascalientes, San Luis, Potosí, Guanajuato, Quenetaro, Michoacan, Colima, and the territory of Tepic. The Sierra Madre range in the eastern portion of the state includes the active volcano Colima (about 14,238 feet) and other high mountains. The largest river is the Santiago, or Lerma, which forms the cascades of Juanacatlan in the vicinity of the city of Guadalajara. At that point the river is 520 feet wide, and falls 65 feet. A large electric plant utilizes the force generated by these falls, supplying electric power to a number of factories. Lake Chapala, the source of the Santiago, is the largest body of water in the republic. The total mineral production of the state is somewhat more than \$2,250,000 Mexican silver. There are numerous silver, gold, copper, iron, lead, and cinnabar mines. The high table-lands of the eastern regions have a temperate or cold climate, and produce cereals; in the valleys and on the hot lowlands of the coast sugar-cane, cotton, vanilla, tobacco, oranges, and coffee are cultivated. The maguey plant is one of the chief products of the district of Tequila. The annual output of sugar is 11,000 tons of the raw, and 15,000 tons refined. The capital of the state, Guadalajara (q.v.), has become in recent years one of the chief manufacturing centres in Mexico, producing large quantities of *manta*, or unbleached cotton, and leather goods. More than \$300,000 Mexican silver is appropriated annually for the maintenance of schools, which are attended by 31,725 pupils. Private and church schools have an attendance of 14,106. The population of the state in 1900 was 1,137,311.

Jalla'o, a West Indian market-name for the margeate-fish (q.v.).

Jamaica, ja-mä'ka, the largest of the British West India Islands. It occupies the central position in the Antillean region, being nearly equidistant from Florida and the northern point of South America; from the mouths of the Orinoco and Galveston; from the head of the

SOUTH AMERICAN JAGUAR AND TAPIR.



JAMAICA

Gulf of Honduras, on the west, and St. Thomas, on the east. Its greatest length is 144 miles; greatest breadth, 49 miles; area, 4,200 to 4,218 square miles. The eastern part of the island has, as its most commanding feature, the Blue Mountain range (highest peak 7,360 feet). The centre and west, an elevated plateau of later geologic formation, show the characteristic Antillean limestone, and, more perfectly here than elsewhere in the West Indies, the extraordinary results of exposure of that soluble material to the tropical rainfall. This upland plain, by the action of the elements, has been carved into hills, basins, called "cockpits," 500 feet or more in depth, and much larger and deeper valleys, in which the plantations are situated, and from which the numerous streams often find their way to the sea by underground passages. One of these depressions, the Clarendon Valley (drained through a cañon), is 25 miles wide and 50 miles long; another, St.-Thomas-in-the-Vale, is circular in form, with a diameter of about 10 miles. Throughout the western half of the island such valleys occur, some with, others without, apparent drainage outlets. Coastal plains are most extensive on the south side, where the largest, the plain of Liguanea, has an area of 200 square miles. There are no navigable rivers, but a great number of small streams, pools, and thermal springs. In the limestone region there are many caverns, interesting on account of their size, beauty, or the relics of the old Indian population which they contain. The mean temperature at the coast is very little more than 78° F.; that of the larger part of the habitable regions (1,000 to 3,000 feet above sea-level) is about 73° F.; and at the altitude of 5,500 feet it is 60° F. The maximum for a period of 10 years at Kingston, on the south coast, averaged 87.8° F., and the minimum 70.7° F. On the plateau the annual variation is scarcely 9°; for example, at St. Elizabeth the maximum is 75° F. and the minimum 67° F. As a whole, the island has a pleasant climate. The average rainfall is 66 inches, the extremes being 100 inches on the high mountains and 44 inches at Kingston. The death-rate is 20.9 in 1,000; but this favorable showing, as compared with the other islands of the Antilles, is due much less to natural advantages than to the strict enforcement of local sanitary and quarantine regulations. The total number of inhabitants in 1903 is estimated at about 780,000. The census of 1891 showed 639,491, five sixths of the entire population being blacks or colored people; the whites numbering 14,692, and East Indian coolies 10,116. The birth-rate is little less than twice the death-rate. The Jamaican negroes are fairly good laborers when well fed; the menial work of the island is performed by them, and they are regarded as cheerful, honest, and respectful servants. They have no share whatever in the government.

Fauna, Flora, and Agriculture.—Jamaica has no native mammals. There are many species of lizards, including the large iguana, a few harmless snakes, and the slightly poisonous centipede and scorpion; in the lowlands mosquitoes, ants, and sand-flies are common; butterflies, fireflies, and beetles, parrots, pigeons, water-fowls, and 20 different kinds of song-birds are enumerated. Edible marine fish are seldom caught near the island, but the streams contain a few fresh-water species. The flora is distinguished

from that of the other Antillean regions by the total absence of the royal palm, and by the abundance of pimentos, or allspice-trees, which are found nowhere else. Common trees are the ceiba, mango, wild orange, cocoa-palm, plantain, fustic, logwood, and cedar. Begonias, orchids, ferns, and grasses abound, except on the southern coast, which has a flora of the arid type, including the cactus, thorny acacias, etc. There are 739,256 acres under cultivation (tillage 200,168, pasturage 413,152, etc.). Of this total, 83,549 acres are devoted to pimento (allspice), but chiefly as a by-product on lands also used for stock-raising. Since the abolition of slavery the production of sugar has fallen off very greatly. In 1805 Jamaica exported 151,000 hogsheads of sugar, and 5,000,000 gallons of rum; in 1897 the cultivation of sugar-cane constituted only 19 per cent of the whole agricultural industry; in 1902 only 27,342 acres were under this crop. Other products have gradually taken its place, as shown in the following statement of areas devoted to them: Ground provisions, 91,733 acres; coffee, 31,265 acres; bananas, 32,842 acres; cocoanuts, 13,244 acres; etc. Since the great frosts in Florida (1895-6) the exportation of oranges from Jamaica has been carried on profitably; since 1886 tobacco has been grown and cigars for exportation made on a large scale. Coffee from the Blue Mountain estates is of fine quality. The cultivation of cocoa has increased in recent years; ginger grows most readily in the rich soils on the mountains; and among the other exports may be mentioned annatto, lime-juice, tamarinds, nutmegs, a number of dye-woods, cabinet-woods, etc. Special instruction in agriculture is given at the schools, and agricultural and horticultural interests are encouraged by the government and active private associations.

Commerce, Railways, Roads, etc.—The United States has the most important trade relations with Jamaica, furnishing a large part of the staple food supplies, and affording the best market for the island's fruit and sugar. Thus, in 1895-6, the total exports were valued at \$8,900,000, the United States taking 57 per cent, and Great Britain 27.6 per cent. Imports in the same year amounted to \$13,722,500, Great Britain, Canada, and other British possessions furnishing about 55.6 per cent, and the United States 41.8 per cent. There are about 185 miles of railway, 683 of telegraph, and 154 of telephone. In the year 1901-2 the number of letters and postal-cards transmitted by the post-office was 5,424,814. The system of public highways (3,600 miles), extending into all parts of the island, is admirable: the roads are thoroughly well built and graded, have substantial bridges, and are kept in good repair. The principal line of steamships is the Royal Mail, with fortnightly sailings between England and the Caribbean ports. The Atlas Line and the Boston Fruit Company's steamers maintain communication with New York, Boston, Philadelphia, and Baltimore. A steamer from Kingston circumnavigates the island once a week.

Government, Education, and Religion.—The executive authority is vested in a governor, appointed by the king. He is assisted by a secretary, attorney-general, director of public works, collector-general, and the commanding officer of the military forces. The legislative council consists of 29 members, with the governor as

JAMAICA—JAMAICA BAY

president; of the whole number 14 are elected (term 5 years), 10 nominated, and 5 are the administrative officers mentioned above. Admittance to the lower grades of the civil service is gained through competitive examinations. The government medical service has in charge 18 public hospitals. The police system includes more than 100 stations in different parts of the island; a force of more than 1,500 men (769 district constables); several prisons, reformatories, and industrial schools. In 1902 the strength of the regular forces stationed in Jamaica was 1,866 officers and men; militia, 763. Fortifications and batteries are at Port Royal, Rocky Point, Salt Pond's Hill, Rock Fort, Fort Augusta, Fort Clarence, and Apostles' Battery. Ships of the royal navy on the North American and West India station are 13 in number (see also below in connection with Kingston). The judicial department includes a high court of justice (9 members), circuit courts, and a magistrate in each parish. Public revenue and expenditure in recent years, each about \$3,000,000; the public debt in 1897 was given as \$7,581,000. Government schools in 1902 numbered 728, with 84,779 pupils. There are four government training colleges for teachers; several endowed secondary, industrial, and high schools; a public lyceum and museum, with a valuable library, etc. Local examinations are held on the island by the University of Cambridge. In 1870 the Church of England was disestablished and disendowed on the island; in 1902 churches and chapels were: Church of England, 219; Baptist, 189; Methodist, 128; Presbyterian, 73; United Methodist Free Church, 43; Roman Catholic, 28; Moravian, 27; Congregational, 26; Christian Church, 20; and Church of Scotland, 10.

Dependencies.—The Cayman Islands, Turks, and Caicos Islands, and the Morant and Pedro Cays are attached to Jamaica for administrative purposes. Of these, the first group lies in the Caribbean Sea, 180 miles northwest of Jamaica, and comprises Grand Cayman, 17 miles long, 4 to 7 broad; Little Cayman, 9 miles long and about 1 mile broad; and Cayman Brae, 10 miles long and 1 mile broad. The government is administered by a commissioner, and magistrates are appointed by the governor of Jamaica. The population will be referred to under *History*. The second group, Turks and Caicos Islands, situated nearly 500 miles northeast of Jamaica, geographically belongs to the Bahamas; but the governor of Jamaica exercises a supervising power over the local authorities (a commissioner and legislative board of 5 members). Area, 165 square miles; population, 5,350; capital, Grand Turk; products, salt, sponges, pink pearl, etc. The Morant Cays and Pedro Cays are situated, respectively, about 33 miles southeast, and about 45 miles southwest, of Jamaica.

Chief Towns.—Kingston, the capital, has 46,542 inhabitants, a good water-supply and system of sewerage, well-lighted streets, large shops, a street-railway, etc. The town is, however, unattractive; residences of the officials and wealthy merchants are built in the suburbs. Public institutions are the museum, library, colonial offices, schools, churches, almshouse, penitentiary, asylum, and Victoria Market. Four miles away is the important naval station of Port Royal, headquarters for the British West India naval forces, and a strongly fortified

place. Spanish Town, population 5,019, at one time the capital, is situated 15 miles west of Kingston. Port Antonio, on the northeast side of the island; Montego Bay, population 4,803; Savanna-la-Mar, Falmouth, Lucea, St. Ann's Bay, Buff Bay, Port Morant, Black River, etc., are distributed among the three counties of Surrey, Middlesex, and Cornwall.

History.—The native word from which we have the name Jamaica signifies "island of fountains." Names recalling the old Spanish occupation of the island are Montego (Spanish Manteca), Bog Walk (Spanish Boca del Agua), Wag Water (Spanish Agua Alta), and others. As a Spanish colony (1509–1665) Jamaica was backward and of little consequence; the total population in the year last mentioned, when an English fleet captured it, was only 3,000. One half of that number took refuge in Cuba. The settlers who arrived subsequently were peasants from Scotland, Ireland, and England, English subjects from the other West Indian islands, and Jewish traders from Minorca. Negroes were brought from Africa in great numbers; the old town of Port Royal being chosen as a convenient point from which to reship slaves to the other islands and the mainland. That town, once a place of great wealth and importance, was ruined by repeated calamities. "On 7 June 1692 happened that earthquake which swallowed up great part of Port Royal," says Edwards, who explains that the town "was chiefly built on a bank of sand, adhering to a rock in the sea, and a very slight concussion, aided by the weight of the buildings, would probably have accomplished its destruction." Hurricanes in 1712 and 1722, and a conflagration 13 July 1815, completed the work of obliteration. Toward the close of the 18th century the island was occupied by large plantations, and was exceedingly productive. Before that time 60,000 slaves had been landed at Port Royal. The freeing of the negroes (see EMANCIPATION) resulted in the abandonment of the island by many landlords. The effort to regain the lost prosperity through diversified agriculture has already been mentioned. In August 1903 a hurricane inflicted great injury at several points in Jamaica, and destroyed life and property on the Cayman Islands. The population of the latter was 4,322 according to the census of 1891, and the productions tropical fruits.

Consult: Hill, 'Cuba and Porto Rico, with the other Islands of the West Indies'; and Edwards, 'History of the British West Indies.'

MARRION WILCOX,
Authority on Spanish America.

Jamaica, a part of the borough of Queens in the city of New York. Prior to 1 Jan. 1898 Jamaica was the county-seat of Queens County on Long Island, but that portion of Queens County in which Jamaica is situated has been incorporated in the city of New York (Greater New York). The town was settled as early as 1656. Several houses built before the Revolutionary War are in a good state of preservation. In the vicinity there are a large number of market gardens. One of the New York State normal schools is situated in Jamaica.

Jamaica Bay, an inlet of the Atlantic Ocean which indents the southeast shore of Long Island. It is nearly circular in shape; the Rockaway Beach extends across the side toward the ocean and makes of the bay a land-locked body

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of water. A number of islands are in the middle and at the entrance. The whole of the bay, except an inlet, Head Bay on the east shore, is within the limits of New York city; Coney Island is near the entrance to the bay.

James, Saint, called the "Greater," the son of Zebedee. He was called to be an apostle, together with his brother Saint John, as they were mending their nets with their father, who was a fisherman. They then followed Christ, were witnesses with Saint Peter of the transfiguration, and accompanied our Lord in the garden of Gethsemane. In the lists of the apostles given in the synoptic Gospels and in the Acts the names of Peter, Andrew, James, and John stand first; and it is plain that these four were at the head of the 12 throughout. After the ascension Saint James persevered in prayer with the other apostles and the women and the Lord's brethren. Nothing further is certainly known of him till the passover of 44, when, being in Jerusalem, the Jews stirred up Herod Agrippa I. against him, who put him to a cruel death. Thus Saint James was the first of the apostles who suffered martyrdom. There is a legend that he went to Spain, and that his bones lent miraculous aid to the Spaniards against the Saracens.

James, Saint, called the "Less," an apostle, the brother or cousin of Jesus. He is called in Scripture the "Just," and is probably the apostle described in Matt. x. 3 and elsewhere as the son of Alpheus. He was the head of the church in Jerusalem when the Scribes and Pharisees threw him down from the gable of the temple, and a fuller dashed out his brains with a club, about the year 62. This is the account of his death given by Hegesippus, a Christian of Jewish origin, who lived in the middle of the 2d century, and it differs somewhat from the narrative of Josephus. Some critics maintain that James, the son of Alpheus, was one person, and James, the brother of Jesus, another. Whether James was the author of the epistle which bears his name is considered doubtful.

James I., king of England, and VI. of Scotland, the only child of Mary, Queen of Scots, by her cousin Henry Stuart, Lord Darnley: b. Edinburgh Castle 19 June 1566: d. palace of Theobalds, Hertfordshire, 27 March 1625. In 1567 he was solemnly crowned at Stirling, and from that time all public acts ran in his name. His childhood was passed in civil wars, under the regencies of Murray, Mar, and Morton, during which time he resided in Stirling Castle, under the tuition of the celebrated Buchanan. From the first he seems to have imbibed those exalted notions of the royal authority and divine right which proved so injurious to his posterity. But James soon found it advisable to ally himself with Queen Elizabeth and accept a pension from her. When, however, it became apparent that the life of his mother was in danger from the sentence of an English judicature, James sent representatives to England to intercede with Elizabeth; but his whole procedure in the matter shows a singular callousness. As a matter of form he ordered the clergy to pray for his mother, but when the news of Mary's execution arrived James was not much moved, though he attempted to make a show of indignation by

condemning one of the commissioners to death, a sentence which, however, he commuted to banishment. On 23 Nov. 1589 James married Anne, daughter of Frederick II., king of Denmark. On his return home, after passing the winter in festivities at Copenhagen, he was in some danger from the unruliness of the nobles; and for several succeeding years of his reign the history of Scotland displays much turbulence and party contest. In 1603 James succeeded to the crown of England, on the death of Elizabeth, and proceeded amidst the acclamations of his new subjects to London. One of his first acts was to bestow a profusion of honors and titles on the inhabitants of both countries. At a conference held at Hampton Court between the divines of the Established Church and the Puritans James exhibited the ill-will he bore to popular schemes of church government. The meeting of Parliament also enabled him to assert those principles of absolute power in the crown which he could never practically maintain, but the theoretical claim of which provided the increasing spirit of freedom in the House of Commons with constant matter of alarm and contention. Although James had behaved with great lenity to the Catholics in Scotland, those in England were so disappointed in their expectations of favor, that the famous gunpowder plot was concerted in 1605, the object of which was to blow up the king and Parliament. (See GUNPOWDER PLOT, THE) In 1612 he lost his eldest son Henry, a prince of great promise, then 19; and in the following year the eventful marriage of his daughter Elizabeth with the elector palatine took place. No circumstance in the reign of James was more unpopular than his treatment of the celebrated Sir Walter Raleigh (q.v.). James had set his heart on marrying his son Charles to a Spanish princess, but the negotiations failed through the overbearing temper of Buckingham, the royal favorite, who quarreled with the grandees of the Spanish court. The close of the life of James was marked by violent contests with his Parliament. He was also much disquieted by the misfortune of his son-in-law, the elector palatine, who, having been induced to accept the crown of Bohemia, and to head the Protestant interest in Germany, was stripped of all his dominions by the emperor. Urged by national feelings for the Protestant cause, he was at length (10 March 1624) induced to declare war against Spain and the emperor; and troops were sent to Holland to act in conjunction with Prince Maurice. James was not destitute of abilities nor of good intentions, but the former were not those of a ruler, and he was neither beloved at home nor esteemed abroad. He received during his lifetime a great deal of adulation on the score of his literary abilities. Consult: Aikin, "Memoirs of the Court of King James the First" (1822); Burton, "History of Scotland" (1873); Macaulay, "History of England" (1858); S. R. Gardner, "History of England from the Accession of James I. to the Spanish Marriage" (1863-9); ibid., "The First Two Stuarts" (1876).

James II., king of England, second son of Charles I. and of Henrietta of France: b. London 15 Oct. 1633; d. St. Germain, France, 16 Sept. 1701. He was at once declared Duke of York, though only formally raised to that

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dignity in 1643. At the Restoration in 1660 he took the command of the fleet, as lord high-admiral, and was also made Warden of the Cinque Ports. He had previously married Anne, daughter of Chancellor Hyde, afterward Lord Clarendon (q.v.). In 1671 the Duchess of York died. Before her death she declared herself a convert to the Roman Catholic faith, which had been secretly that of the duke for many years, and was now openly avowed by him. This declaration laid the foundation of the opposition which finally drove him from the throne. A test act being soon after passed, to prevent Roman Catholics from holding public employments, the duke was obliged to resign his command. On 21 Nov. 1671 he married Mary Beatrice of Este, daughter of the Duke of Modena, and in 1677 his eldest daughter, Mary, was united to William, prince of Orange.

On the death of Charles II., 6 Feb. 1685, the duke succeeded, under the title of James II., and from the time of his ascending the throne seems to have acted with a steady determination to render himself absolute, and to restore the Roman Catholic religion. At variance with his Parliament he was under the necessity of accepting a pension from Louis XIV. He sent an agent to Rome to paye the way for a solemn re-admission of England into the bosom of that Church, conduct which encouraged the rebellion of the Duke of Monmouth. The unrelenting temper of James was again exhibited in the executions on this account. The legal proceedings under Jeffreys were brutal in the extreme; and no fewer than 320 persons were hanged on the western circuit alone, which attained an unenviable notoriety as the Bloody Assize. He gradually proceeded to a direct attack on the Established Church, by the formation of an ecclesiastical commission, which cited before it all clergymen who had done anything to displease the court. Apparently to conciliate the Puritans a declaration of indulgence in matters of religion was ordered to be read by the clergy in all the churches of the kingdom, but its real object, however, was to favor the Roman Catholic element. Seven bishops met and drew up a loyal and humble petition against this ordinance, and for this act they were sent to the Tower, on a charge of seditious libel. On 29 June 1688 they were acquitted amid the most enthusiastic rejoicings of the populace. The innovations, in regard both to the religion and government, gradually united opposing interests, and a large body of nobility and gentry concurred in an application to the Prince of Orange, signed by seven of the most prominent and influential political leaders, to occupy the throne. James, who was long kept in ignorance of these transactions, when informed of them by his minister at the Hague, was struck with terror equal to his former infatuation; and, immediately repealing all his obnoxious acts, practised every method to gain popularity. All confidence was, however, destroyed between the king and the people. William arrived with his fleet in Torbay 5 Nov. 1688, and landed his forces, amounting to 14,000 men. Several men of rank went over to William, and the royal army began to desert by entire regiments. Incapable of any vigorous resolution, and finding his overtures of accommodation disregarded, James resolved to quit the country. He repaired to St. Ger-

main, where he was received with great kindness and hospitality by Louis XIV. In the meantime the throne of Great Britain was declared abdicated, and was occupied, with the national and parliamentary consent, by his eldest daughter, Mary, and her husband, William, conjointly; Anne, who had equally with her sister been educated a strict Protestant, being declared next in succession, to the exclusion of her infant brother, known in history as the Pretender, who had been born on 10 June of that year. Assisted by Louis XIV., James was enabled, in March 1689, to make an attempt for the recovery of Ireland. The battle of the Boyne, fought 1 July 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive. Consult: Burnet, 'History of the Reign of King James the Second'; Cavelli, 'Les derniers Stuarts à Saint Germain-en-Laye' (1871); Klopp, 'Der Fall des Hauses Stuart' (1875-88).

James I., king of Scotland, of the house of Stuart: b. Dunfermline 1394; d. Perth 21 Feb. 1437. He was the son of Robert III. In 1406, while on his way to France, he was taken by the English and carried to the Tower of London. For the next 18 years he remained a prisoner in England, being confined during part of his captivity in Nottingham Castle, Evesham, and Windsor Castle, where he wrote the 'King's Quhair' and other poems. Robert III. died very shortly after learning of his son's captivity, and James was proclaimed king; but during the remainder of the reign of Henry IV., and the whole of that of Henry V., he was detained in England, with a view to prevent the alliance of Scotland with France. In 1424, under the regency of the Duke of Bedford, he was restored to his kingdom, at which time he was in his 30th year. Previous to his departure he married Jane or Joanna Beaufort, daughter of the Earl of Somerset, a lady of the blood royal of England, who is the fair dame alluded to in his poem 'The King's Quhair.' On his return to Scotland he restored Scotland to some degree of order, but so severe was his treatment of his turbulent nobles that he was at last murdered by their emissaries at Perth in the 13th year of his reign.

James II., king of Scotland, son of James I.: b. 16 Oct. 1430; d. Roxburgh, Scotland, 3 Aug. 1460. During the minority his kingdom was distracted by struggles for power between his tutors Livingston and Crichton and the great house of Douglas. In 1449 he assumed the government and married Mary of Guelderland. He had latterly allied himself with the Douglasses, but being deprived of all real power, he resolved to free himself from their yoke. This he did in 1452 by inducing the Earl of Douglas to come to Stirling Castle, where he stabbed him with his own hand. He then quelled a powerful insurrection headed by the next earl, whose lands were confiscated. In 1460 he infringed a truce with Henry VI. of England by besieging the castle of Roxburgh, and was killed by the bursting of a cannon in the 29th year of his age.

James, III., king of Scotland, son of James II.: b. 10 July 1451; d. 11 June 1488. He was crowned at Kelso on his father's death, but in 1465 came under the influence of Bishop Ken-

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nedy and the Boyd family, one of the latter espousing the king's sister in 1467. James married Margaret of Denmark in 1469 and dismissed the Boyds from favor only to advance other favorites. Prominent among these was Cochrane, through whom one brother of James was obliged to flee the kingdom, and another was put to death. The nobles seized Cochrane and five others and hanged them. Subsequently a plot was formed to dethrone the king, and though many peers remained loyal to him the royal army was defeated at Sauchie, near Stirling. James escaped from the field, but was murdered during his flight.

James IV., king of Scotland: b. 17 March 1473; d. Flodden 9 Sept. 1513. He was the son of James III. He commanded the nobles who vanquished and killed his father at Sauchieburn, and was crowned at Scone in June 1488. He married Margaret, the daughter of Henry VII. of England, but taking umbrage at the hostile attitude of his brother-in-law, Henry VIII., allied himself with France. He was defeated and slain at the battle of Flodden (q.v.) during an invasion of England.

James V., king of Scotland, son of James IV.: b. Linlithgow, Scotland, 10 April 1512; d. Falkland Palace 14 Dec. 1542. He came to the throne under the regency of his mother in 1513 and assumed the reins of government in 1528. He married Madeleine of France in 1537, and on her death married the daughter of the Duke of Guise, Mary of Lorraine, in 1538. He ruled with much vigor and decision, and on account of his mingling freely with his people was called "the king of the commons." Becoming entangled in war with England in 1542 he was defeated at the battle of Solway Moss and died a month later. He was succeeded by his daughter, Mary, Queen of Scots, who was but seven days old at his death.

James, Bushrod Washington, American oculist: b. Philadelphia 25 Aug. 1836. He was graduated from the Homeopathic Medical College of Pennsylvania in 1857, became well known as a practitioner, was elected president of the Pennsylvania Homeopathic Medical Society in 1873, of the American Institute of Homoeopathy in 1883, and in 1896 was vice-president of the Homoeopathic Medical Congress held at London, England. His publications include: 'American Climates and Resorts' (1889), a manual of climatology (1889); 'Alaskana' (1892); 'Echoes of Battle' (1895); and 'Alaska: Its Neglected Past and its Brilliant Future' (1897; rev. ed. 1901).

James, Charles, English novelist and playwright: b. London 26 Dec. 1858. He received a private education, became lieutenant-colonel of the Royal West Kent regiment, and published: 'A Bird of Paradise' (1889); 'The New Faith' (1890); 'Honors Easy' (1892); 'A Worker in Iron' (1894); 'At the Sign of the Ostrich' (1895); and 'Where Thames is Wide' (1896); etc.

James, Edmund Janes, American college president: b. Jacksonville, Ill., 21 May 1855. He was educated at Northwestern University and at Harvard, was principal of the high schools at Evanston and Normal, Ill. (1878-82), professor of public finance and administration in

the Wharton School of Finance and Economy of the University of Pennsylvania (1883-95), and professor of political and social science in the university (1894-95). In 1896 he became professor of public administration in the University of Chicago and director of the extension division, and in 1902 president of the Northwestern University. He became president of the American Academy of Political and Social Science in 1889, vice-president of the National Municipal League in 1896, and in 1891-5 was president of the American Society for the Extension of University Teaching. His writings include: 'The Legal Tender Decisions' (1887); 'The Canal and the Railway' (1890); 'The Federal Constitution of Germany' (1890); and 'The Growth of Great Cities in Area and Population' (1900).

James, Florence, "FLORENCE WARDEN," English novelist: b. Hanworth, Middlesex, 16 May 1857. She taught as a governess, 1875-80, and was on the stage, 1880-5. Her novels, many of which are strongly sensational in tone, have been very popular in this country as well as in England. They are published under the pseudonym "Florence Warden," and among them are: 'At the World's Mercy'; 'The House on the Marsh,' which established her reputation; 'A Prince of Darkness'; 'Scheherezade'; 'A Perfect Fool'; 'Pretty Miss Smith'; 'A Lady in Black' (1897); 'A Very Rough Diamond'; 'Morals and Millions'; 'One too Often' (1901); 'A House with a History.'

James, George Payne Rainsford, English novelist and historian: b. London 9 Aug. 1801; d. Venice 9 May 1860. As a young man he traveled widely on the Continent. He began his writing under the influence of Scott's novels, and wrote in all over 100 novels; he was also known as the author of popular historical books, and in 1839 was appointed historiographer royal, in this capacity writing 'History of the United States Boundary Question' and 'The Corn Laws.' In 1850 he was British consul in Massachusetts, two years later was transferred to Norfolk, Va., and in 1856 became consul general at Venice. His novels include: 'Richelieu' (written 1825, published 1829); 'Darnley' (1829); 'DeLorme' (1830); 'Philip Augustus' (1831); 'Henry Masterton' (1832); 'The Gypsy' (1835); 'Attila' (1837); 'Man at Arms' (1848); 'King's Highway' (1848); 'Agincourt' (1844); 'The Smuggler' (1845); 'Ticonderoga' (1854). His historical works include: 'Memoirs of Great Commanders' (1832); 'Life of the Black Prince' (1836); 'Life of Richard I.' (1842-9). James' novels were very popular when first written, and a new edition appeared in 1903.

James, George Wharton, American explorer, lecturer and ethnologist: b. Gainsborough, Lincolnshire, England, 27 Sept. 1858. He has spent many years in making geological and other researches in California, and elsewhere in the southwestern United States, and is a member of various learned societies in this country and England. He has published: 'The Lick Observatory' (1888); 'Nature Sermons'; 'Picturesque Southern California'; 'Missions and Mission Indians of California'; 'From Alpine Snow to Semi-Tropical Sea'; 'In and Around the Grand Canyon' (1900); 'Indian Basketry'

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(1900); 'The Indians of the Painted Desert Region' (1903).

James, Henry, American Swedenborgian theologian: b. Albany, N. Y., 3 June 1811; d. Cambridge, Mass., 18 Dec. 1882. He was educated at Union College and Princeton Theological Seminary, traveled abroad and became a Sandemanian and later a Swedenborgian. He subsequently lived in New York, Newport, R. I., and lastly at Cambridge. Among the most noted of his works on morals and religion are: 'What is the State?' (1845); 'Moralism and Christianity' (1852); 'Lectures and Miscellanies' (1852); 'The Nature of Evil' (1855); 'Christianity the Logic of Creation' (1857); 'Substance and Shadow' (1863); 'The Secret of Swedenborg' (1869). His 'Literary Remains,' edited by William James, appeared in 1885.

James, Henry, American novelist and essayist: b. New York 15 April 1843. He was the son of a clergyman, Henry James (q.v.), who gained fame as a writer on philosophico-theological subjects, first from the Sandemanian, and afterward from the Swedenborgian standpoint. The novelist, known until his father's death as Henry James, Junior, was educated under his father's guidance in New York, Geneva, Paris, and Boulogne. He lived in Europe with his parents during the years 1855-9, and after his return to the United States studied in the Harvard Law School in 1862. He began his literary career about 1865 as a contributor to American magazines, and soon afterward published 'The Story of a Year, a tale of the American Civil War.' In 1869 he took up his residence in Europe, and since then he has resided chiefly in England and Italy. 'Roderick Hudson' (1875) was his first long novel. His subsequent novels include: 'Watch and Ward' (1878), originally published in 1871 in the 'Atlantic Monthly'; 'The American' (1877), by some regarded as his best; 'Daisy Miller' (1878); 'The Europeans: a Sketch' (1878); 'Confidence' (1880); 'Washington Square' (1880); 'A Bundle of Letters' (1880); 'Diary of a Man of Fifty' (1880); 'The Portrait of a Lady' (1881); 'The Bostonians' (1886); 'Princess Casamassima' (1886); 'The Tragic Muse' (1892); 'The Other House' (1896); 'The Spoils of Poynton' (1897); 'What Maisie Knew' (1897); 'The Awkward Age' (1899); 'The Sacred Fount' (1901); 'The Wings of a Dove' (1902); 'The Better Sort' (1903). He has also written a great many short stories, among which are: 'A Passionate Pilgrim, and other Tales' (1875); 'Pension Beaurepas' (1878); 'An International Episode' (1879); 'The Madonna of the Future, and Other Tales' (1879); 'The Siege of London' (1883); 'The Point of View' (1883); 'Tales of Three Cities' (1884); 'The Author of Beltraffio, and other Stories' (1885); 'Stories Revived' (1885); 'The Aspern Papers, and other Stories' (1888); 'The Reverberator' (1888); 'A London Life, and other Stories' (1889); 'The Lesson of the Master, and other Stories' (1892); 'The Real Thing, and other Tales' (1893); 'Picture and Text' (1893); 'The Private Life' (1893), a collection of stories; 'The Album' (1894); 'The Reprobate' (1894); 'Tenants' (1894); 'Disengaged' (1894); 'Terminations, and other Sto-

ries' (1896); 'In a Cage' (1898); 'The Two Magics' (1898), consisting of two stories; and 'The Soft Side' (1900), a series of stories. In very many of his stories he describes the life of Americans in Europe, and they depend for much of their interest upon the contrasts between American and European character and institutions. Though a very prolific writer, he is never careless, his style being always felicitous, while in respect to the substance of his work he ranks as the subtlest of American novelists. A dramatic version of 'The American' was produced in London in 1891, but neither it nor his subsequent play 'Guy Domville' (1895) was successful. He has turned his intimate knowledge of modern French literature to good account in his volume of essays entitled 'French Poets and Novelists' (1878). Other works of a similar kind are 'Transatlantic Sketches' (1875); 'Portraits of Places' (1884); 'A Little Tour in France' (1884; new ed. 1900); 'Partial Portraits' (1888); 'Essays in London and Elsewhere' (1893). He also contributed the volume on 'Hawthorne' (1879) in the 'English Men of Letters' series, and in 1903 published 'William Wetmore Story and his Friends,' a notable biography.

James, Thomas Lemuel, American banker: b. Utica, N. Y., 29 March 1831. He early learned the printer's business and bought out a weekly Whig paper, the 'Madison County Journal,' at Hamilton; and in 1856 changed its name to the 'Democrat-Republican,' which was for 10 years the most powerful Republican organ in Madison County. He was collector of canal tolls at Hamilton 1854-5; was appointed inspector of customs in New York 1861; weigher in 1864; and in 1870 was promoted to be deputy collector in charge of the bonded warehouse, which department he immediately proceeded to arrange according to a new system. In 1873 President Grant appointed him postmaster of New York, and he was reappointed by President Hayes in 1877. He filled this office with signal success and originated improvements in the delivery system involving the whole postal methods of the United States. President Garfield in 1881 gave him the portfolio of postmaster-general, and his chief important service during his 10 months' incumbency was his initiation of inquiries which led to the investigation of the Star Route frauds. In 1882 he became president of the Lincoln National Bank of New York.

James, William, American psychologist and philosopher: b. New York 11 Jan. 1842. He is the son of Henry James, theologian (q.v.), and brother of Henry James, novelist (q.v.). He was educated in private schools and by tutors in New York and abroad, studied in 1861-3 at the Lawrence Scientific School of Harvard University, accompanied the Thayer expedition to Brazil in 1864-5, was graduated from the Harvard Medical School in 1870, in 1872 was appointed instructor in anatomy and physiology at the school, and in 1876 assistant professor of physiology. In 1885 he was appointed assistant professor of philosophy in the university, in 1889 professor of psychology, and subsequently professor of philosophy. He was Gifford lecturer on natural religion in the University of Edinburgh in 1899-1901. His best known work has

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been done in the domain of analytical psychology, in which he won European recognition. His works are marked by a most readable style and skilful exposition of different topics. He was a founder of the American Society for Psychological Research in 1884, and published: 'Principles of Psychology' (1890); and 'Psychology, Briefer Course' (1892), both popular text-books; 'The Will to Believe' (1897); 'Human Immortality' (1898); 'Talks to Teachers on Psychology' (1899); and 'The Varieties of Religious Experience' (1902).

James Bay, an inlet of Hudson Bay, in the southern part. The bay was named in honor of Captain Thomas James, an English navigator, who explored this body of water in 1631–3. The bay is about 320 miles long and from 140 to 160 miles wide. It contains a number of islands, the largest, Agomska, being about 70 miles in length. Several large rivers flow into James Bay; the Albany, Moose, Noddaway, and East Main are the largest. Moose Factory, at the mouth of Moose River, on the southern shore, is the most important Canadian trading station, next to York Factory, of the Hudson's Bay Company.

James, Epistle of, an encyclical letter addressed to the Jews of the Dispersion. It was written by a Jew for Jewish readers, all of whom are supposed to be subject to the Jewish law. Its date is about 50 A.D., at latest, certainly before the fall of Jerusalem. The epistle was not at first admitted into the canon, and it is not much quoted by the earlier writers, Origen indeed being the earliest we find quoting it by name. Eusebius places it in his list of books controverted but recognized by most (*Antilegomena*), and Jerome expresses the doubt more strongly still. It was finally declared canonical by the third Council of Carthage (397), and already we find it acknowledged by Cyril of Jerusalem, Epiphanius of Cyprus, Athanasius, Gregory of Nazianzus, and all later theologians, down to the time of the Reformation, when it was rejected by Erasmus and Cardinal Cajetan, and stigmatized by Luther as "a downright epistle of straw . . . with nothing evangelical about it," although Calvin thought that it was worthy of an apostle.

The aim of the epistle is throughout ethical rather than doctrinal, Christianity being prominently put forward as the ethical fulfilment of the law, the perfect man being he whose faith has constantly proved itself in practice, and who is patient under all tribulation. It echoes closely the language and method of Christ himself; as Beyschlag says, "essentially it is the teaching of Christ, and thus there is little teaching about Christ." Besides the discourses of the Master, especially his Sermon on the Mount, we find distinct traces of familiarity with the Wisdom of Solomon, and the Ecclesiasticus of the son of Sirach. Formalism, greed of gain, respect of persons, falsehood, evil-speaking, boasting, wrangling and bitterness in debate, attention to dogmatic definitions instead of holiness of life—such are the sins against which the author inveighs with vivid and abrupt invective. His Greek is unusually pure, and some scholars, as Schmidt, Bertholdt, and Bishop Wordsworth, have supposed that the epistle was first written in Aramaic and afterward translated.

The passage in the second chapter (14–26) has been interpreted by many theologians as a direct attack on the Pauline view of faith and justification, that Christ by his death had accomplished a new order of salvation, in which the law, which was merely temporary, was now abrogated, and that thus Christianity had fitted itself to become a universal religion; but Paul's conception is more philosophical and comprehensive, although it by no means excludes the conception of James, whose faith without works is not Paul's justifying faith at all, but the profitless faith without love condemned in I Cor. xiii.

The Tübingen school, as might have been expected, claimed the Epistle of James as a polemic against Paul, and made its author a pseudonymous writer of later time, who employed the name of James as an accepted type of spiritualized Jewish Christianity.

Bibliography.—Besides the general introductions of Bleek, De Wette, S. Davidson, Hilgenfeld, Holtzmann, Salmon, Dods, and Weiss, and the works on the New Testament canon by Kirchofer, Overbeck, Westcott, and Zahn, may be consulted the special commentaries by Bassett (1876), Reuss (1878), Erdmann (1881), Schegg (1883), E. H. Plumptre (1884), Beyschlag (1888; the 5th ed. of the commentary in the 'Exegetisches Handbuch'), and R. Johnstone (2d ed. 1888).

James Island, an island in Charleston harbor, in South Carolina. It is separated from the city of Charleston by the Ashley River and the South Channel of the harbor, here a little over a mile wide. On the northeast coast of the island is Fort Johnson and nearby a quarantine station. Just northeast of the island is Fort Sumter (q.v.). The battle of Secessionville, fought on 16 June 1862, and several other engagements of the Civil War, took place on this island.

James Milliken University, an organization which includes three institutions of learning: the Lincoln College, located at Lincoln, Ill.; the Industrial School and the Decatur College, at Decatur, Ill. The synods of the Cumberland Presbyterian Church of Iowa, Indiana, and Illinois, founded, in 1865, the Lincoln College. Schools of art, music and elocution, a classic college, and a preparatory department, at times a commercial school, all made up Lincoln College. The Decatur College and Industrial School are endowed institutions opened in 1903. In 1900–01 a fund for a university was provided by gifts from James Milliken, an appropriation from the Cumberland Presbyterian synods of Iowa, Illinois, and Indiana, and donations from the citizens of Decatur. The three schools mentioned were united in the James Milliken University, but each one retains to a certain degree its own independence.

James River, a stream which has its rise in Wells County, in North Dakota, and flows south into South Dakota, and in a southerly direction across the State into the Missouri River. Some of the largest cities and towns of the interior of both North and South Dakota are on or near the James River; Aberdeen, Huron, Mitchell, and Yankton near the mouth, in South Dakota; and Jamestown in North Dakota. It is about 450 miles long.

James River, the largest river in Virginia, has its rise in the western part of the State, in

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the Alleghany Mountains; the head-waters are the Jackson and Cowpasture rivers which unite at Covington, in Virginia. The James flows southeast to Buchanan, in Botetourt County, then northeast to Balcony Falls, where it breaks through the Blue Ridge Mountains, again southeast to Lynchburg, then northeast to Scottsville, from which point the general course is southeast to the Chesapeake Bay. Its length is about 450 miles. At the Rocketts, just below Richmond, where the river becomes a tidal stream, is the head of navigation for steamboats of 130 tons, about 150 miles from the mouth. Ocean steamers come up the river as far as City Point, at the mouth of the Appomattox River. From City Point to the mouth, 66 miles, the stream is really a broad, deep estuary with Hampton Roads (q.v.) at its entrance to the Chesapeake. The falls in the river at Richmond, about 100 feet in six miles, furnish a large amount of water power. From Richmond to Buchanan, a distance of nearly 200 miles, the Kanawha Canal follows the course of the river and utilizes extensive reaches of slack water navigation. The chief tributaries of the James are the Chickahominy (q.v.) from the north, and the Appomattox from the south. The broad body of water at the entrance into Chesapeake was early explored by European navigators, and Jamestown (q.v.), the first permanent English settlement, was located on this river.

Jameson, jā'mē-sōn, Anna Brownell Murphy, English author and art critic: b. Dublin 17 May 1794; d. Ealing, Middlesex, England, 19 March 1860. In 1827 she was married to Robert Jameson, afterward speaker of the House of Assembly of Upper Canada, and attorney-general, but the union proved unhappy. She made her first appearance as an authoress by the publication of the 'Diary of an Ennuyée' (1826), which was very favorably received. Her 'Loves of the Poets' appeared (1829), and was succeeded by 'Memoirs of Female Sovereigns' and 'Characteristics of Shakespeare's Women.' In 1836 Mrs. Jameson visited her husband in Canada, and published 'Winter Studies and Summer Rambles in Canada' (1838). Later works of hers include: 'Handbook to the Public Picture-galleries of Art' (1842); 'Companion to the Private Galleries of Art in London' (1844); 'Memoirs of the Early Italian Painters' (1845); 'Memoirs and Essays on Art, Literature, and Social Morals' (1846); 'Sacred and Legendary Art' (1848); 'Legends of the Monastic Orders' (1850); 'Legends of the Madonna' (1852). In these the author has given admirable expositions of the works of the old masters and the religious bearings of mediæval art. Few writers have done so much to refine the public taste, and diffuse sound canons of art criticism. Consult: Macpherson, 'Memoirs of the Life of Anna Jameson' (1878).

Jameson, John Franklin, American historical writer: b. Boston 1 April 1859. He was graduated from Amherst College in 1879 and was professor of history at Brown University 1888-1901. He has been managing editor of the 'American Historical Review' from 1895 and the head of the department of history at the University of Chicago from 1901. He has published 'History of Historical Writing in America' (1891); 'Dictionary of United States History' (1894); etc.

Jameson, Leander Starr, Scottish physician, administrator, and freebooter: b. Edinburgh 8 Feb. 1853. He studied medicine in Edinburgh and London, began professional practice at Kimberley, Cape Colony, in 1878, in 1891 became administrator of Rhodesia for the British South Africa Company, and in 1895 led the now well known raid into the Transvaal. During disturbances between the Boers and the Uitlanders, or foreigners, in the South African Republic, Jameson had, by order of Cecil Rhodes (q.v.), then premier at the Cape, assembled a Rhodesian military force on the Transvaal border, to act in case of emergency. On 29 December, with 600 troopers, Jameson, proceeding on his own judgment, entered the South African Republic for the support of the Uitlander party. His force was compelled to surrender to the Boers at Doornkoop on 2 Jan. 1896. Jameson, with his officers, was handed over by President Kruger to the British government for trial. He was sentenced, May 1896, to ten months' imprisonment, but in December was released because of illness. In 1897 he returned to Rhodesia, and in the second Boer war served in the English army. Jameson's surrender was followed by a congratulatory message to Kruger from the German emperor which for a time threatened serious consequences.

Jameson, Patrick Henry, American physician: b. Monroe Township, Jefferson County, Ind., 8 April 1824. At 19 he went to Indianapolis, taught school there four years, studying medicine meanwhile, and was graduated from Jefferson Medical College, Philadelphia, in 1849. He then returned to Indianapolis, where he became very prominent as a physician. During the Civil War he served as military surgeon and was commissioner of the Indiana hospital for the insane, 1861-80. He was likewise active in the establishment of the Indianapolis city hospital and in the organization of the University of Indianapolis, and was for 30 years a director of Butler College, at Indianapolis. From 1863 to 1869 he was a member of the Indianapolis common council and compiled the city ordinances in 1865. He has published 'Memoirs of Prominent Physicians of Indianapolis.'

Jameson Raid, The. See JAMESON, LEANDER STARR.

Jamestown, jāmz'town, N. Y., city in Chautauqua County, on the Conewango Creek, which is the outlet of Chautauqua Lake; and on the Erie and the Jamestown & C. L. R.R.'s; about three miles from Chautauqua Lake, 25 miles from Lake Erie, and 70 miles, by rail, southwest of Buffalo. Lake steamers and trolley cars connect it with a number of the nearby towns. The first permanent settlement was made in 1810, by settlers in search of agricultural lands. The location, so near the outlet of the lake and in the midst of a fertile agricultural region, attracted settlers, and in 1815 the town was planned; and was incorporated as a village in 1827. The country around developed rapidly, but Jamestown was not chartered as a city until 1886. The chief manufactures are furniture, woolen goods, photographic paper, metallic goods, boots and shoes, agricultural implements, and brooms. It has saw-mills, canning factories, lumber and brick yards. The city has the James Prendergast Free Library, containing about 17,000 volumes, and an excellent high school.

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The municipal officers are a mayor, who holds office two years, a city council, a clerk, overseer of the poor, sealer of weights and measures, constables, assessors, justices of the peace, and police justices, all of whom are elected by the people. Other subordinate officials are appointed by the mayor subject to the approval of the council. Jamestown was the home of Reuben E. Fenton (q.v.). There are about 8,000 Swedes now living in Jamestown. Although they are adopted citizens, those born in Sweden still use their native language in the homes; and they have their own Swedish papers and literature. Pop. (1890) 16,038; (1900) 22,892.

Jamestown, N. D., city, county-seat of Stutsman County; on the James River, and on the main line and a branch of the Northern Pacific railroad; about 80 miles west of Fargo, on the Red River of the North, and 100 miles east of Bismarck on the Missouri River. It is situated in an agricultural region, noted for its extensive wheat fields and large stock farms. Some of the industrial establishments are flour-mills, grain elevators, stock-yards, wholesale groceries, lumber and brick yards. It is the trade centre for a large extent of country, and the small towns off the railroad procure their local supplies of manufactures and groceries from Jamestown. Pop. (1900) 2,853.

Jamestown, Va., in James City County, the first permanent English settlement in the New World, and capital of Virginia 1607-98; on what was a peninsula of the James River some 32 miles from its mouth, nearly opposite the present Williamsburg, with a neck overflowed at high tide, and since then washed away, leaving the place an island; the front also has been eaten away by the river, so that the site of the original huts is submerged. It was ill chosen and malarious, and the place never prospered; but no towns did in early Virginia. It was founded 13 May 1607 by the company of Gosnold, Wingfield, John Smith, etc., with Capt. Newport; and was first a triangular wooden blockhouse called Fort James, after the king, around which some huts sprang up. These were entirely destroyed by fire in 1608, but soon rebuilt. In 1609 there were 50 or 60 wooden houses of one and two stories, with a chapel and a storehouse, surrounded by a log palisade 15 feet high, and with a fort at the neck. During the Starving Time of 1609-10 it was nearly depopulated, and on 7 June 1610 the remnant deserted it and started for England; but meeting Lord Delaware with provision ships at the mouth of the river, all turned back and reoccupied it. Delaware found the chapel "ruined and unfrequented." In 1616 John Rolfe says there were 50 inhabitants. By 1619 a church of hewn timber 50 x 20 had been built; in July 1619 the first legislative assembly in America was held there. A timely warning enabled its inhabitants to escape the great Indian massacre of 1622, and it was a place of refuge for those outside it. The first brick edifice in Jamestown was erected in 1640; a brick church some time after; between 1676 and 1684 was built the brick church whose ivy-mantled tower still stands, and which is incorrectly supposed by many tourists to be the one in which Rolfe married Pocahontas. About the same time a

more ambitious fort was begun, with a magazine still traceable; but so injudiciously located for guarding the river-channel that it was above instead of below the place to be defended. Jamestown has little history separate from the colony thence till Bacon's Rebellion (q.v.); as Berkeley's capital, it was burnt to the ground by Bacon, that it might no longer "harbor the rogues." Again rebuilt, in the last decade of the century it was once more destroyed by fire, and never rose from its ashes. It had long been dwindling, and removal of the capital had been mooted, and in 1698 Williamsburg was made the capital. Till very recent years the ruins of Jamestown were left to sink gradually into the encroaching river; but some years ago the Association for the Preservation of Virginia Antiquities bought it, and with the help of the national government have built a sea-wall and saved the relics from further destruction. Besides the church tower, a few tombstones and remains of two or three houses still exist. Consult Tyler, 'Cradle of the Republic' (1900).

Jamestown Weed. See DATURA.

Jamieson, jā'mi-sōn, **Cecilia Viets Dakin**, American novelist: b. Yarmouth, N. S., 1848. She was married in 1878 to Samuel Jamieson of New Orleans. She has published 'The Story of an Enthusiast': a novel (1887); 'Lady Jane'; 'Toinette's Philip'; 'Seraph'; 'The Little Violinist'; 'Woven of Many Threads'; 'The Lily of San Miniato'; etc.

Jan Mayen, yān miēn, an island in the Arctic Ocean, about 250 miles northeast of Iceland; area, about 160 square miles. It is volcanic, with an irregular surface, mountainous near the extinct volcano, Beerenburg, about 6,500 feet in height. One of the active volcanoes is about 1,500 feet high. There are some large glaciers on the island, one near Beerenburg. Vessels from Norway and Scotland occasionally visit the island. In 1882-3 scientists from Austria lived on the island for some months, engaged chiefly in making meteorological observations. The island was named after Jan Mayen, a Dutch navigator, who discovered the land in 1611. Later it was ascertained that Henry Hudson visited the island in 1607.

Janauschek, yā'now-shēk, **Fanny** (FRANZISKA MAGDALENA ROMANCE), American actress: b. Prague, Bohemia, 20 July 1830. She first went upon the stage in Cologne, playing in that city and also in Frankfort, 1848-60, and subsequently played in Dresden and the principal cities of Germany. In 1852 she was married to Captain Frederick Pillot, of the German navy. She made her first tour in America, 1867-9, playing in the German language and securing most favorable notice. Returning to Germany she studied English, and in 1873 made her second visit to the United States, when she played in English the most exacting Shakespearian roles. She has also been very successful in such roles as Meg Merrilles, Mary, Queen of Scots, and in double roles, as in 'Bleak House' and other plays. She retired from the stage in 1898, making her home in Brooklyn, N. Y.

Jane Eyre, ār, a famous novel by Charlotte Brontë, published in 1847. In the character of Jane Eyre, the young authoress first found an outlet for the storm and stress of her own

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nature. The book is therefore autobiographical in the truest sense.

Janes, Edmund Storer, American Methodist Episcopal bishop: b. Sheffield, Berkshire County, Mass., 27 April 1807; d. New York 18 Sept. 1876. In 1830 he entered the Methodist ministry in the Philadelphia conference, in 1835 became financial agent for Dickinson College, in 1840-4 was financial secretary of the American Bible Society, and in 1844 was elected bishop. In connection with his episcopal duties he traveled widely in the United States and abroad, and subsequent to the Civil War aided in the reorganization of his Church. He had some reputation as a preacher.

Janes, Lewis George, American scholar and author: b. Providence, R. I., 19 Feb. 1844; d. Greenacres, Maine, 5 Sept. 1901. He was president of the Brooklyn (N. Y.) Ethical Association in 1885-96, lecturer on sociology and civics in the School of Political Science there in 1893-6, and in 1896 became director of the Cambridge (Mass.) conferences and the Monsalvat school of comparative religion. In 1899 he was elected president of the Free Religious Association of America. Among his works are: 'A Study of Primitive Christianity' (1887); 'The Evolution of Morals' (1889); 'Life as a Fine Art' (1891); 'War and Progress' (1893); 'Cosmic Evolution as Related to Ethics' (1895); 'Social Ideas and Social Progress' (1899); and 'Health and a Day' (1901).

Janesville, jānz'v'il, Wis., city, county-seat of Rock County; on the Rock River and on the Chicago, M. & St. P. and the Chicago, N. W. R.R.'s; about 85 miles northwest of Chicago and 60 miles southwest of Milwaukee. The first permanent settlement as a village was in 1837, and it was chartered in 1853. Janesville is located in an agricultural region, noted for the amount and quantity of tobacco raised. The chief manufactures are agricultural implements, foundry products, wagons and carriages, furniture, cotton and woolen goods, boots and shoes, flour, fountain pens, and school supplies. It has large lumber and brick yards, storage houses, and stock yards. Its principal trade is in its own manufactured goods, farm and dairy products. Some of its principal buildings are the State School for the Blind, the Saint Joseph's Convent, the Y. M. C. A. buildings, two hospitals, the churches, high school, public library, court house, and city hall. The mayor holds office for two years. The mayor, council, board of education, attorney, city clerk, treasurer, sealer of weights and measures, and justices of the peace are chosen by popular election. The mayor appoints, subject to confirmation by the council, the directors of the public library; the council elects the city engineer, the assessors, and the street commissioners. The members of the fire and the police departments are selected from the eligible civil service lists. From 1885 to 1903 there has been a constant and healthy expansion in industrial and commercial lines. Pop. (1890) 10,836; (1900) 13,185.

Janiuay, hā-ne-wī, Philippines, a pueblo of the province of Iloilo, Panay, situated 18 miles northwest of the town of Iloilo, near the Jalaur River. It lies in a hilly country and petroleum has been reported in the vicinity. Pop. 28,700.

Janizaries, jān'ī-zā-rīz (Turkish, *jeni-tcheri*, new soldiers), an infantry force of Turkey, first

organized by the Sultan Orkhan about 1330, and in 1362 increased to about 10,000 by Amurath I., who gave them considerable importance by bestowing on them special privileges. The janizaries thus became a class of warriors so deeply imbued with the military spirit that they proved in many instances a means of salvation to the empire. It was their boast that they had never fled in battle, and they were the nerve and sinew of the Ottoman army. The regular troops of janizaries at one time amounted to 60,000 or more, but they were afterward reduced to 25,000. They were kept in barracks in Constantinople and a few other cities. The irregular troops amounted to 300,000 or 400,000, and were scattered among all the cities of the empire, in time of peace performing police duties. The janizaries who constituted the sultan's bodyguard became in time so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. In 1826 they rebelled on account of a proposal to form a new militia, when the sultan, Mahmoud II., having displayed the flag of the Prophet, and being supported by their commander-in-chief, defeated the rebels and burned their barracks, when many of them perished in the flames. A royal proclamation abolished the corps. As many as 15,000 were executed, and fully 20,000 were banished.

Janko (yōn'kō) **Keyboard**, a keyboard for the pianoforte, invented 1882 by Paul von Janko; introduced in London 1888, in New York in 1890. It consists of six rows or banks of keys arranged like a fan, placed in a semi-circle. Each note has three different keys. The keyboard can be attached to any pianoforte, grand, upright or square.

Jans, Anneke, än'nā-kē yäns (or ANNETJE), Dutch colonist in America: d. Albany, N. Y., 1663. She came from Holland to New Netherland in 1630 with Roeloff Jansen, her husband, who secured in 1636 a grant of a tract of land containing 62 acres and reaching from the Hudson to the present Broadway and from a point near Desbrosses Street to Warren Street. In 1654, Anneke, upon the death of her second husband, Everardus Bogardus (q.v.), obtained in her name a patent-right to the tract. In 1671 the land was sold by the heirs to the English Governor Lovelace. Three of the heirs, however, did not sign the document. Subsequently the property was confiscated by the English government and deeded to Trinity Church corporation (1705). From 1749 the possession of the property has been the subject of numerous suits by the heirs, based chiefly on the omitted signatures, and all decided for the defendants.

Jansen, yān'sēn, or jān'sēn, **Cornelius**, Dutch theologian: b. near Leerdam, Holland, 28 Oct. 1585; d. Ypres, Belgium, 6 May 1638. From his 17th year he applied himself to the study of theology and first came into notice while professor of theology at Louvain (1630), as a teacher of the most rigid Augustinianism, especially in connection with the doctrine of free will and divine mercy. This brought him into conflict with the Jesuits. He was appointed (1636) bishop of Ypres, where he completed his famous work, on which he had labored for 22 years, under the title 'Augustinus, sive Doctrina Sti. Augustini de Humanæ Naturæ Sanitate, Ægritudine, Medicina.' In this he

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declared philosophy, especially that of the Aristotelians, to be the source of Pelagian error, and in accordance with rigid Augustinianism, maintained the utter corruption of human nature and the extinction of free will, together with predestination. The school of thought he thus founded is now known as Jansenism (q.v.).

Jansenism, jān'sen-ism, the teaching of the Jansenists, a sect of Christians still existing in the Netherlands and named after Cornelius Jansen, bishop of Ypres. They profess to hold the truth as it was taught by Augustine, bishop of Hippo, and prefer to be called 'Disciples of St. Augustine.' The free grace of God, the free will of man, and predestination, in the Augustinian sense, formed the main articles of their belief. The Jansenists were, however, accused of reviving the teaching of Michael Baius (1513-80) which had been pronounced heretical by Popes Pius V. and Gregory VIII. Baius taught that original justice is an integral part of human nature, and not a free gift of God; that fallen man, being utterly depraved in his nature, is incapable of doing good; that all actions of man in the natural order are sinful, and that divine grace compels men to be and do good, without the concurrence of their will. The book of Jansen was condemned by Urban VIII. in his 'In Eminentia' (1642), but the pope's decree was not generally accepted in Flanders. The Jesuit Molina and the Molinists, his followers, supported views opposed to those of Jansen. Alexander VII. declared that the errors attributed by the Molinists to Jansen, and which the Jansenists said could not be found in 'Augustinus' were held and enunciated by Jansen. The Port Royalists, Arnauld, Nicole and Pascal, wrote famous books defending Jansen against the Jesuits.

In 1679 Arnauld and his followers were constrained to take refuge in the Netherlands. In 1702 the Sorbonne decided that a priest accused of Jansenism could grant absolution. In 1694 Quesnel's 'Moral Reflections' were published and the controversy had been revived. In his bull 'Unigenitus,' Clement XI. condemned the Jansenist passages in Quesnel's work and the author fled to Brussels, and died in Holland 1719. The Jansenists of Utrecht number about 8,000; they profess to be Roman Catholics, are governed by an archbishop, to whom, however, the pope always refuses confirmation and the gift of the palla. They reject the bull 'Unigenitus' and published a protest against the dogmas of the Immaculate Conception, and Papal Infallibility. Consult: Reuchlin, 'History of Port Royal' (1844); Fuzet, 'Les Jansenistes du 17me Siècle' (1877); Jervis, 'History of the Church of France' (1872). See PASCAL, BLAISE; ARNAULD.

Janssen, John, American Roman Catholic bishop: b. Keppeln, Rhine Province, 3 March 1835. He pursued theological courses in the seminary of Münster, and in 1858 in the United States, was ordained priest in 1858, was in missionary work at Springfield and Alton, Ill., was vicar-general of Alton diocese in 1870-7 and 1879-86, and in 1888 was consecrated bishop of Belleville, Ill.

Januarius, jān-ū-ā'rī-ūs, Saint: b. Naples or Benevento, Italy, 21 April 272; d. Pozzuoli, Italy, 19 Sept. 305. He became bishop of Benevento in 303 and at the time of the persecution

of the Christians by Diocletian was beheaded. He is the patron saint of Naples. His body lies in the crypt of the cathedral at Naples; and two phials of his blood which a pious matron caught, according to tradition, at his execution, are preserved in a chapel in the south aisle. It is asserted that the blood liquefies on being brought near the head of the saint. A trial is made on three festivals of each year, the chief of which is the anniversary of the martyrdom, and also when public danger and calamity exists or is impending. It is believed that the patron saint is particularly propitious if the blood moves briskly in the phials and appears of a clear red, while the opposite is regarded as presaging some ill to the country.

January, the first month of the year, was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March, and consisted of only ten months. Numa is said to have added January and February to the calendar; but although the Romans as early as 251 B.C. accepted January as the first month of the year, the nations of Europe did not universally adopt it as such till the 18th century. The 25th of March was the beginning of the ancient Jewish year, and that day, instead of 1 January, long held a legal position in Christian countries as the opening of the new year.

Janus, jā'nūs, an ancient Latin divinity, after whom the first month of the year was named. He was held in great reverence by the Romans, and was represented with two faces, one looking forward, the other backward. All doors, passages, and beginnings were under his care. His principal festival was New Year's Day, when people gave each other presents. The temple of Janus, which was open in time of war and closed in time of peace, was shut only three times in the long space of 700 years.

Janvier, jān've-ā, **Thomas Allibone**, American author: b. Philadelphia, Pa., 16 July 1849. He received a common school education; was an editorial writer for the *Philadelphia Press, Bulletin, and Times* in 1870-81; lived in New York during most of the period 1884-94, and then made his residence in France and England. Among his works are 'The Mexican Guide' (1887), 'The Aztec Treasure House' (1890), and 'Stories of Old New Spain' (1891), material for which was largely derived through visits to Mexico and New Mexico; 'An Embassy to Provence' (1893), the chronicle of a European journey; 'In Old New York' (1894), popular historical sketches; 'The Passing of Thomas, and Other Stories' (1900); 'In Great Waters' (1901); 'The Dutch Founding of New York' (1903).

Japan, an empire off the northeast coast of Asia, consisting of an archipelago in the North Pacific Ocean. Besides Nippon or Hondo, Kiusu, and Shikok, three large mountainous and volcanic islands, with about 500 smaller islands, forming Old Japan or Japan proper, it comprises the outlying large island of Yezo or Hokkaido, north of Hondo, separated by Tsugarn Strait; the long chain of the Kurile Islands between Yezo and Kamchatka; the Loo-choo or Liu-Kiu Islands, stretching southwestward toward Formosa, and lastly Formosa and the Pescadores Islands, acquired as a result of the

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war with China in 1804. The Japanese dominions which extend between lat. 24° and 49° N., and lon. 120° and 150° E., are separated from the Asiatic continent by the Sea of Okhotsk, the Sea of Japan, the Strait of Korea, Tong Hai or the Eastern Sea, the Strait of Tokien or Formosa, and are distant from China 420 miles, from Kamchatka 270 miles, and from California, 5,000 miles. The area of Japan proper is estimated at 111,239 square miles, of which Hondo, the main island, occupies 87,846; Kiusiu 16,839, and Shikok 6,932 square miles. Yezo has an area estimated at 36,300 square miles, and adding the Kurile and Loo-Choo Islands, and Formosa (area 13,300 square miles), the total area of the empire is fully 160,000 square miles. The native term *Nippon*, *Nipon*, or *Dai Nippon*—‘Great Nippon,’ the latter word meaning “Sunrise” or “East,” a former specific name for the largest island of the group, is really the name of the empire, the Japanese now calling this island Hondo or Honshiu. The capital of the empire is Tokio or Yeddo; other important towns are Osaka, Kioto, Nagoya, Kobé, Yokohama, Hiroshima, Nagasaki.

Political Divisions.—Japan anciently divided by native geographers into the eight great divisions of Gokynay, Tokaydo, Tosando, Fukurokudo, Sanindo, Sanyodo, Nankaydo, and Saykaydo, subdivided into 68 provinces or principalities, and these again into 622 districts, now comprises for Japan proper the three great fu or residential districts of Tokio, Kioto, and Osaka, and 43 ken or rural prefectures, Yezo and Formosa having minor subdivisions for administrative purposes.

Physical Features.—The largest island, Hondo, is upward of 700 miles long northeast and southwest, breadth varying from 50 to 100 miles; Kiusiu, on the southwest, separated from Hondo by the Strait of Shimonoseki, which in one part is narrowed to 2 miles width, is about 200 miles long north to south and 120 miles broad; Shikok, the third and smallest of the three principal islands, is 140 miles long by 60 miles broad. It lies east of Kiusiu, and is separated from it by the Strait of Bungo, which at its narrowest part is not more than 10 miles broad. The straits which divide Shikok from Hondo are scarcely broader, and are thickly set with small islands. The more or less enclosed stretch of sea between Kiusiu, Shikok, and Hondo is known as the Inland Sea. Yezo is of a roughly triangular form, having its sides respectively 300 miles, 260 miles, and 220 miles in length. It is separated from Hondo on the southeast by the Strait of Tsugar, Matsmai, or Sangar, about 8 miles broad in the narrowest part. West of Hondo lies the important island of Sado. The coasts of the larger islands are extremely irregular, being deeply indented with gulfs, bays, and inlets, which form magnificent harbors, although in the north especially, they are difficult of access, not only from the multitude of rocks and islands that surround them, but from the prevalence of gales and fogs. Though there are some large plains, the surface of the country is in general very much broken by hills and valleys, and in many instances rises into mountains of great elevation. This is especially the case in the main island, which is traversed throughout its whole length by a regular chain of mountains, the highest peak of which, Fusi-yama (Rich Scholar Peak)—a

dormant volcano, covered with perpetual snow—is 13,977 feet high; but the elevation of the range is in general so low as to admit of cultivation up to the watershed of its streams. The Japanese islands form a part of the line of volcanic action which commences, in the north, with the Aleutian Isles, passes through the Philippines, Sumbawa, and Java to Sumatra, and then in a northwest direction to the Bay of Bengal. The volcanic vents, which indicate the direction of the line, are numerous in Yezo, Hondo, and Kiusiu; earthquakes, often causing great devastation, are of frequent occurrence, and it is calculated that every seven years a Japanese city is destroyed by their agency. In Yezo some dreadful eruptions have occurred—one in 1783 destroyed 23 villages; and the volcano of Wunzendake, one of five active in the island of Kiusiu, is the terror of the surrounding inhabitants—an eruption of it in 1792 having destroyed 53,000 people. Almost equally disastrous was the tidal wave in 1866, which, besides causing the death of over 26,000 people, injured many thousands more, and destroyed a vast amount of property.

Hydrography.—Streams are numerous in Japan, but have very short courses and are for the most part rather torrents than rivers. Though valueless as channels for the development of commerce they are of great value for the purposes of irrigation. The principal rivers or gawas of the main island are: the Shinanogawa, which rises in Shinano, and after a northward course of 320 miles flows into the Sea of Japan; the Tonegawa, which rises in Kodzuke, and after a course of 170 miles flows into the Pacific near Tokio; the Kisogawa, which enters the gulf of Izeh; and the Yodogawa, the outlet of Lake Biwa, which flows into Osaka Bay. Ishikari in Yezo is the longest river of Japan, having a course of 407 miles. There are a number of lakes scattered throughout the islands, the largest being Biwa or Omi, in the southern part of Hondo, about 40 miles long.

Geology and Mineral Resources.—The prevailing formations in these islands are trachyte and basalt; plastic clay, marl, and feldspar occur in various localities; and there are whole mountains of porcelain earth. The metallic wealth of the empire is known to be very great, comprising gold, silver, copper, tin, lead, and iron. The island of Sado is particularly mentioned as rich in gold. Both the tin and copper of Japan are considered to be of very superior quality. Coal is found in various parts, and the output is rapidly increasing, though it does not as yet much exceed 6,000,000 tons annually. Petroleum is becoming a product of some consequence. Sulphur abounds; thermal and mineral springs are of frequent occurrence; and ambergris is met with on some of the shores. Among the precious stones are agates, carnelians, and jaspers of great beauty, while pearls, frequently of large size, are found in the shell fisheries around the islands.

Climate.—The climate of Japan, though extremely various—being intensely cold in the north, and warm in the south—is, on the whole, much milder than its latitude would indicate; owing, chiefly, to the influence of the surrounding ocean. A remarkable difference of climate exists also between the east and west shores; the cold being more intense on the

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latter than the former, owing to the proximity of the Asiatic continent; while the east coasts are protected from the cold continental winds by the lofty central ridge of mountains that traverses the islands north to south. From March to the second half of May a splendid spring prevails; from June to September summer extends, introduced by heavy rains followed by intense heat; from September to the end of November there is a brilliant autumn; and three months of winter succeed, rendered not unpleasant by the continued serenity of the sky. In Kiusiu, and in the south parts of Hondo, the thermometer ranges between 29° and 104^b F., 80° being the average in the middle of summer, and 35° in the coldest months of winter. In lat. 32° N. ice is formed of several lines in thickness; in lat. 36° the lakes are covered with a sheet of ice, and in 38° to 40° the ice becomes so thick that the rivers may be crossed upon it; while in Yezo, near Cape Saga, lat. 45° 21' N., winter is so severe as to drive the hardy Ainos to the protection of caverns. Rain is very frequent; hurricanes and water-sprouts also occur often, and typhoons and equinoctial gales frequently sweep the seas about the change of the monsoons.

Forestry.—The forests of Japan cover an area of 20,62 square miles and, especially in Yezo, form a source of wealth that is as yet comparatively neglected. Japan produces most of the trees common to temperate regions. The fir and cedar grow to immense size, the latter sometimes to the diameter of 18 feet. Of the oak, two species are peculiar to the country; their acorns when boiled form a palatable and nutritious article of food. The mulberry and the varnish tree grow wild. The nuts of the latter yield solid oil for candles, as do those of the camphor tree, which lives to a great age, and attains a great size. A camphor tree observed by Kampfer in 1691 was then 36 feet in circumference, the same tree measured by the Dutch traveler Siebold in 1826 was 50 feet in circumference. The people cut the root and stem into small pieces, and procure the camphor by decoction. It has long formed an important article of export. Chestnut and walnut trees are found.

Flora.—The flora as a whole resembles that of a great part of North America. The vegetation is exceedingly various, the products of the tropics being intermingled with those of the temperate and frigid zones. The palm, banana, bamboo, bignonia, and myrtle flourish. Sweet oranges, pomegranates, pears, apricots, peaches, and above 500 of the principal ornamental and useful plants are of foreign origin, having probably been introduced from Korea and China. The *kadsi*, or paper-tree, a species of mulberry, grows naturally in the fields, and furnishes textile fibres from which paper is produced; paper is also made from various other plants. The chrysanthemum is a common and favorite plant, and has become an emblem of Japan. The camellia, cultivated in several hundred varieties, grows to a large size, and is a great favorite both for the beauty of its leaves and of its flowers.

Fauna.—In consequence of the general cultivation of the soil the wild animals are necessarily few in number; but bears, hyenas, deer, hares, foxes, and wild boars are still found in the north of Hondo. Dogs are common; there

is a small highly prized species of spaniel, from which it is supposed was derived the English variety known by the name of King Charles. Though cats exist in thousands, the country is said to be overrun with rats and mice. Among the animals are flying-squirrels and monkeys. There is a great variety of birds—including song-birds, birds of prey, birds of the pheasant kind, and in particular numerous water-birds, of which the cormorant is trained to catch fish for its owner. Snakes are not unfrequent, and at least one species is venomous; there are also tortoises, lizards, scorpions, and centipedes; and of the insect tribes there are white-ants, winged grasshoppers, and several beautiful varieties of moths. The seas abound in fish, which are taken in great quantities. The rivers of Yezo supply abundance of salmon.

Agriculture.—The soil of Japan is naturally indifferent; but the patient industry of the agriculturists, favored by the genial climate, has covered with vegetation every spot capable of bearing anything. The rugged mountain sides, where the plow cannot be used, are often built up in terraces, and tilled by hand. Agriculture is greatly promoted by a law which provides that land remaining unused for more than a year shall become forfeited to the public. The agriculture of the Japanese is conducted with diligence and skill. Irrigation is judiciously applied, and manure of all kinds is carefully collected and used in the production of generally abundant harvests. In the south the sugar-cane is cultivated with success; and rice yields two harvests, and constitutes the chief article of food. Wheat and barley, maize and millet, are grown to an important extent, and buckwheat, potatoes, melons, pumpkins, and cucumbers in great abundance. Ginger, pepper, cotton, hemp, and tobacco are cultivated in considerable quantities; and there are extensive plantations of the tea plant—yielding, however, a produce inferior to that of China. Silk is also a Japanese product of importance. The gardeners of Japan have attained the art of dwarfing and also of unnaturally enlarging all vegetable productions. They exhibit in the miniature gardens of the towns full-grown trees of various kinds only three feet high, with heads of about the same diameter. They will grow in a box 4 inches long, 1½ wide, and 6 high, a bamboo, a fir, and a plum tree, the latter in full blossom, asking for this portable grove about \$500. The growth of trees is sometimes so stimulated that the branches stretch to a great distance from the trunk, and are supported on props.

Stock-raising.—Buffaloes and zebras are common; but they are used only for carrying burdens and for agricultural purposes. Horses of various breeds—but generally small—are numerous. There are neither asses nor mules, and sheep and cows are few. Domestic fowls are common.

Commerce.—In 1852 American diplomacy succeeded in removing the restrictions which had for centuries hampered the foreign intercourse with Japan, and many ports of the empire have since been opened to external commerce. Prior to that date the foreign commerce of Japan was limited to the Chinese and the Dutch. The Chinese trade was confined to Nagasaki, where a few junks arrived annually from the ports of Amoy, Ningpo, and Shanghai.

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The Dutch were allowed to visit only the port of Nagasaki, where they had a factory on a small island called Desima, in which 12 or 13 merchants lived, closely watched by the Japanese, and allowed very little liberty. Two ships were annually sent from Batavia. Goods were conveyed by land on pack-horses and oxen. But the principal carriage of merchandise was by water, for though the peculiar construction of the Japanese vessels unfitted them for long sea voyages, they were well enough adapted to the navigation of lakes and rivers, and for coasting from port to port, and crossing from island to island. The rapid introduction of railways particularly throughout the main island has greatly stimulated trade and altered the old methods of communication, but the shores of the Japanese group affording great facilities for a coasting trade, from the abundance of harbors and of shelter for vessels of small size, these facilities are energetically used by the people of the coasts, who keep afloat a vast number of vessels, from fishing boats to junks of 300 tons burden. Commerce is free from any impediments by tolls or duties, and the inland trade, carried on with great activity, is promoted by great fairs, which from time to time are held at the city of Kioto. The roads are good, and kept in excellent order, and stables, taverns, and warehouses are abundant for the accommodation of merchants and other travelers. Commercial operations are conducted with promptness and regularity, and sometimes on a most extensive scale. Among the treaty ports open to foreign trade are Nagasaki, Kobé, Hakodate, Osaka, Yokohama, and Nügata. The value of the foreign trade of Japan (exclusive of Formosa) for five years is shown in the following table:

	1897	1898	1899
Imports....	\$130,755,602	\$162,319,704	\$114,529,383
Exports....	82,558,101	84,120,266	109,190,485
		1900	1901
Imports.....	\$156,679,112	\$141,117,374	
Exports.....	104,781,453	133,253,898	

The chief articles of export are silk and silk goods, coal, copper, tea, cottons, rice, matches, porcelain, mats, etc.; the chief items of import are raw and manufactured cotton, woolens, sugar, metals, machinery, petroleum, arms, vessels, etc. The commercial intercourse of Japan is mainly with the United Kingdom, the United States, China, Germany, British India, Hong Kong, Korea and Belgium, Great Britain and her colonies having the largest share, with the United States a close second. In the six months ending with June 1903, Great Britain alone, which had hitherto led in the imports into Japan, was surpassed by the United States, the imports from the latter for that period being \$12,475,246 as against \$11,901,828 from the United Kingdom. Of the treaty ports Nagasaki, Yokohama, and Kobé have by far the greatest share of the trade.

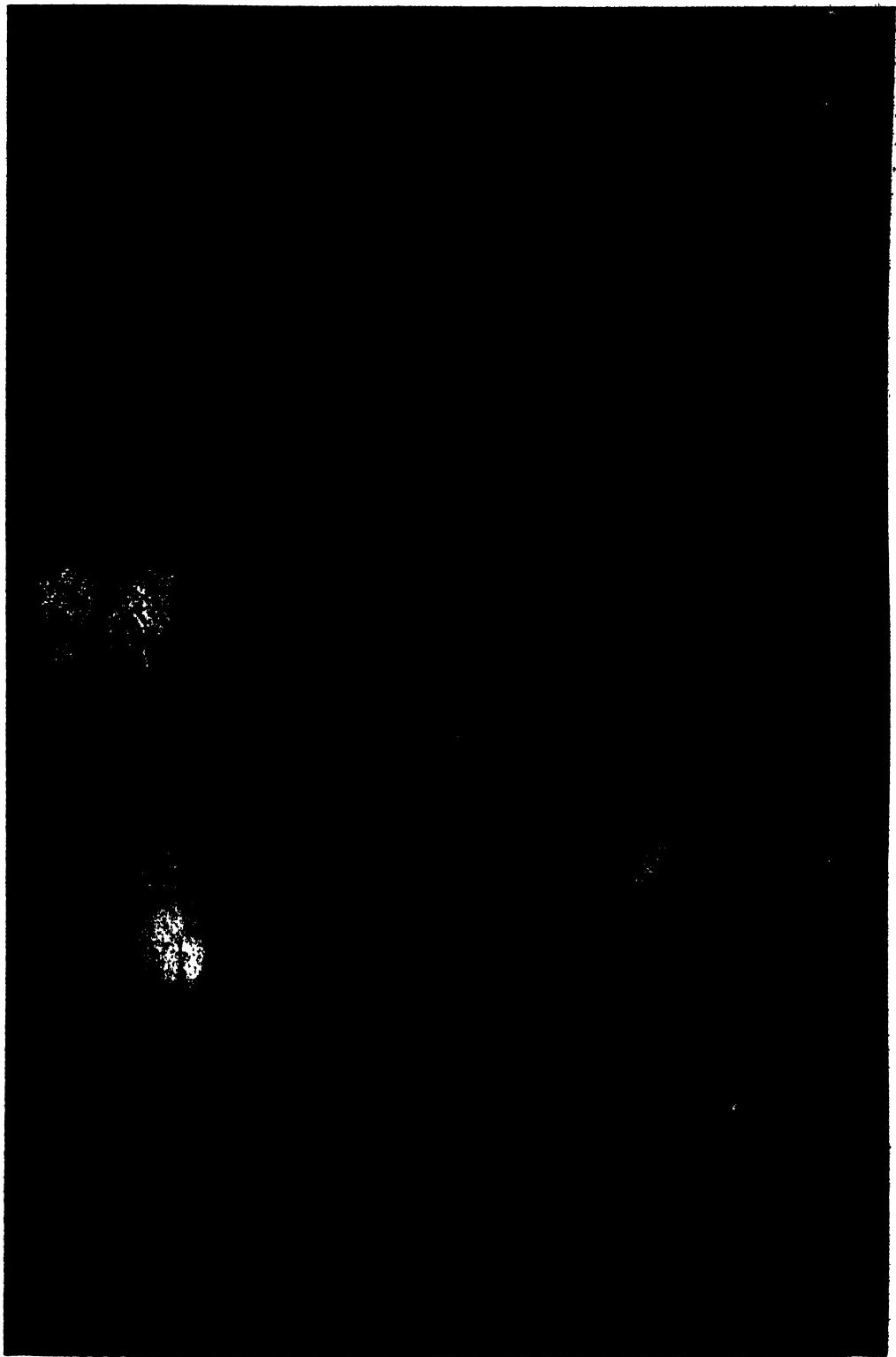
Manufactures.—The Japanese work admirably in iron, silver, gold, and all metals. Manufactures are carried on in every part of the country, and some of them are brought to such a degree of perfection as to surpass those of any other part of the world. Their lacquering in wood excels that of all other nations. They work with great skill in *sowas*, a mixture of gold and copper, which they color blue or black in a manner unknown elsewhere. Their silk and cotton goods are well made, and glass.

pottery, and porcelain in all their branches are of superior manufacture. Their steel swords are unapproachable in quality, and they make excellent mirrors of steel. Paper is made from the bark of the mulberry tree in great abundance and of remarkable strength; it is used not only for writing and printing, and for wrapping goods, but for handkerchiefs and napkins. Paper began to be used in Japan as early as the 7th century, and printing from engraved wooden blocks in the Chinese manner was introduced about 1200 A.D. Printers and booksellers are numerous, and keep the market well supplied with cheap books, many of them profusely illustrated with woodcuts. Like the Chinese, they print only on one side of the paper. Kioto is the chief seat of the book trade, and is eminently a literary city. The Japanese are skilful in carving and die-sinking, and in the casting of metal statues, which are extensively used for idols. Their iron works, tobacco factories, breweries, distilleries, and other manufacturing establishments are frequently on a large scale, employing hundreds of workmen. The cities of Kioto, Tokio, and Osaka are the great seats of manufactures. At Kioto are made damasks, satins, taffetas, and other silk fabrics of every kind, lacquered articles, caps, scarfs, screens, fans, pins, bow-strings, paints, tea boxes, grindstones, and porcelain and earthenware: at Osaka, cotton goods and iron ware; and at Tokio nearly every species of manufacture is carried on. The people show the greatest aptitude for imitating all kinds of occidental manufactures, and they are well supplied with microscopes, telescopes, clocks, watches, knives, spoons, etc., of native make from occidental models, and sold at a very cheap rate.

Modern ordnance, firearms, and ammunition, are also made in native factories, and modern shipbuilding yards for building steel and iron ships are in full operation at Osaka, Uraga, Kawasaki, and Ishikawajima.

Shipping and Navigation.—Exclusive of Formosa and the coasting trade, in 1901, 7,489 vessels, including 3,042 Japanese steamships, 1,344 Japanese junks and sailing ships, 2,998 foreign steamships and 105 foreign sailing ships, with a total tonnage of 11,051,830, entered Japanese ports; 3,064 Japanese steamships, 1,408 Japanese junks and sailing ships, 2,990 foreign steamships and 102 sailing ships, giving a total of 7,564 vessels of 11,064,951 tonnage, cleared the ports. The British ships numbered 1,644 of 4,080,538 tons: 385 were German with 1,192,153 tons; 284 were Russian with 455,243 tons, 188 were Norwegian with 240,906 tons, 175 were Americans with 407,724 tons; and 156 of 303,690 tons were French. The mercantile navy of Japan in 1901 comprised 1,321 modern steamers of 543,258 tons; 3,850 modern sailing vessels of 320,572 tons, and 911 native vessels above 200 "Koku" (about 8 tons) of 415,260 "Koku."

Railways, Roads, Posts, Telegraphs, and Telephones.—The first railroad in Japan was opened in 1872 between Tokio and Yokohama, 18 miles. In 1901 there were 4,026 miles of railroad in operation of which 1,059 were state-owned; over 2,000 miles are projected and building. There were also 227 miles of electric street railroads owned by 14 companies. The chief highways or roads comprised 4,481 miles of government roads and 15,362 miles of prefectural roads. In 1901-2 there were 5,120 post-offices through-



HIS IMPERIAL MAJESTY MUTSUHITO,
The Emperor of Japan.

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GATE OF THE GOLDEN TEMPLE, TOKIO.

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out the empire handling annually a mail of 841,009,844 pieces.

In the same year there were 6,377 miles of telegraph lines and 2,087 miles of submarine cable. The number of telegrams delivered in the year was 16,713,619. The telephone service consisted of 13 exchange offices, 40 calling offices, 8,083 subscribers, and 1,562 miles of communication.

Weights, Measures, and Money.—The chief obstacle to profitable trade after the opening of the ports proved to be the peculiar ideas of the Japanese government on the subject of the currency. The money of Japan consisted of a great variety of gold, silver, and copper coins. The largest gold coin was the obang, a piece 6 inches in length and 3½ in breadth, worth about \$100. It was not in common use. The largest gold coin in ordinary circulation was the cobang, which was 2½ inches in length, 1½ in breadth, and worth about \$7.50. A still more common coin was the itzibue, which when of gold was worth intrinsically about \$1.75. The silver itzibue was the common silver coin, and worth about 20 cents. Foreign coins were not allowed to circulate, and foreigners were compelled to exchange their own money for Japanese coins, at a valuation which rendered it difficult to carry on a profitable trade. Arrangements, however, were made which remedied these difficulties, and a modern monetary law based on the metric system came into force in October 1897. The unit of value is the yen equaling 0.75 grammes of pure gold, for which however there is no corresponding coin, the former one yen silver piece having been withdrawn. The gold coins consist of 20, 10, and 5 yen pieces, the silver coins of 50, 20, and 10 sen pieces, a nickel piece of 5 sens, and bronze coins of 1 sen and 5 rin pieces. The yen is divided into a hundred sen, and the rin is the tenth part of a sen. The weights are the mommē 0.206 mommē = 1 gramme; the kin (160 mommē) = 1.325 pounds avoirdupois; and the Kwan (1,000 mommē) = 8.21 pounds avoirdupois. The measures are the shaku = .994 foot, 3.3 shaku equaling 1 metre; the Sun = 1,193 inches; the ken (6 shaku) = 5.965 feet; the chō (60 ken) = ½ mile; the ri (36 chō) = 2.44 miles; the square ri = 5.9552 square miles; the chō land measure = 2.45 acres. The liquid koku = 39,703 gallons; the dry koku = 4,9629 bushels; the liquid to = 3,9703 gallons, the dry to = 1,9851 peck.

Banking.—The principal bank of Japan is the Nippon Ginko or National bank, founded in 1882 and authorized to issue notes convertible to gold on presentation. The notes in circulation on 1 April 1902 amounted to \$93,597,168. Besides the National bank there are the Nippon Industrial bank, the Yokohama Specie bank, the Hokkaido Colonization bank, and the Taiwan bank. There are also an Agricultural-Industrial bank with 46 branch offices, a Common bank with 1,802 head offices, 1,374 branch offices, a paid up capital of \$122,579,583, and deposits amounting 31 Dec. 1900, to \$218,380,910, and savings banks with 681 head offices, 814 branch offices, a paid up capital of \$13,417,478 and deposits amounting 31 Dec. 1900, to \$14,711,530. In the post-offices which also act as savings bank 2,335,173 persons in 1900-1 deposited \$19,717,006 and withdrew \$7,350,281.

Government and Administration.—The government of Japan was, until 1889, a hereditary absolute monarchy, vested in the mikado, or emperor. This was the ancient form, but in 1585 the emperor's commander-in-chief usurped the governing power, and for nearly three centuries reduced the mikado to a secondary position. The latter resided in the royal and sacred city of Miako (or Kioto), where he was kept secluded, under the guise of a mysterious sanctity; while the shogun, living at Yeddo, exercised imperial authority, and was regarded, by foreigners at least, as a second and supreme sovereign. In 1868, however, a revolution overthrew the power and office of the shogun—he had been usually, but erroneously, called by a Chinese title, tycoon—and the mikado was restored to his ancient supremacy. In 1889 Japan received a constitution, becoming a constitutional monarchy. The mikado is sovereign of the empire, can declare war, make peace, and conclude treaties; and exercises executive powers with the advice and assistance of his cabinet, who are appointed by himself. He is also assisted by a privy-council, who give their advice in important matters when consulted. The cabinet includes the prime minister, and the statesmen at the head of the foreign office, treasury, war, navy, education, public works, etc. The legislative power is vested in the mikado and the diet or parliament, which consists of two houses, a house of peers and a house of representatives. The former consists of members of the imperial family, princes, and marquises; counts, viscounts, and barons elected by their respective orders; and a certain number of persons nominated by the emperor and by a few wealthy taxpayers, the total number being about 300. The house of representatives numbers 300; the members being elected for a period of four years, so many from each electoral district. They are paid, as are also the nominated members of the house of peers.

Finances.—The estimated revenue for 1902-3 was \$136,815,418 and the expenditure \$135,212,247. The chief items of revenue are the land tax, 2½ per cent of the market value of the land, the taxes on saké and other liquors, the tobacco monopoly, customs dues, stamp duties, income tax, and the profits on the public utilitarian services controlled by the government, telegraphs, posts, railways, mines, etc. The principal items of expenditure for 1902-3 were the army \$19,216,158, navy \$10,674,521, justice \$5,418,823, debt charges \$19,952,747, other finance \$10,929,091, etc. The receipt of the Chinese indemnity for the war of 1894-5 has been of great importance in Japanese finance. On 31 March 1900, the total public debt of Japan was \$254,232,097.

Army and Navy.—Every male Japanese of the age of 17-40 is liable to military service, and after reaching the age of 20 has to undergo three years' army training. The army on a peace footing in 1900 numbered 632,007 of all ranks, including 11,611 officers. The social position of the recruits for the army is particularly high, most of them coming from families who have a direct income of five to ten yen. Eighty per cent are sons or brothers of farmers. They are very well educated, as a rule, nearly 8 per cent being graduates of the higher common schools, 8 per cent of equivalent education (though not graduates), 25 per cent graduates of the lower

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common schools, 16 per cent of equivalent education (though not graduates), 27 per cent (besides the foregoing) can read and do ordinary sums in arithmetic, while only 16 per cent cannot read or write.

The Japanese navy has its ministry and department of naval command in Tokio. Since 1895 the expansion of her naval resources has been such as to give Japan a fleet that is now in offensive and defensive armament, in steaming capacity, both as regards speed and distance, and in homogeneity, equal to any in the world of the same size. It comprises 7 battleships and 2 coast defense vessels, 7 first-class armored cruisers, 10 protected cruisers of the second class (with two building) 8 protected cruisers of the third class (with one building), 9 unprotected cruisers, 17 torpedo-boat destroyers and 67 torpedo-boats. Every one of these vessels is of the most modern type of naval constructive science. In 1900 Japan possessed at least four battleships of the first class, all built in England, that were protected by heavier armor over a greater extent of their side areas, and armed with a greater number of the most powerful modern guns than could at that time be paralleled in any British battleship.

The facilities for naval construction and repair possessed by Japan are also exceptional. The naval arsenal at Yokosuka, the foundations of which were laid by French engineers, has now grown to great dimensions. Cruisers of over 4,000 tons have been built in it, and, short of turning out a battleship, there is no work connected with the construction and equipment of a war vessel that cannot there be accomplished satisfactorily. The principal dock was large enough in 1899 to admit the *Victorious*, which was then one of the heaviest battleships in the British navy. Yokosuka lies inside the Gulf of Tokio, the narrow entrance to which is defended by heavy batteries, mounted both on the surrounding hills and in forts built in the gulf. There are two other fully equipped imperial dockyards. The first is situated near Hiroshima on the Inland Sea, where the principal naval college now is, and the second at Sasebo, a port approached by narrow winding channels, on the west coast of the southern island of Kiusiu. These two dockyards also are so strongly fortified as to be accounted impregnable to maritime attack.

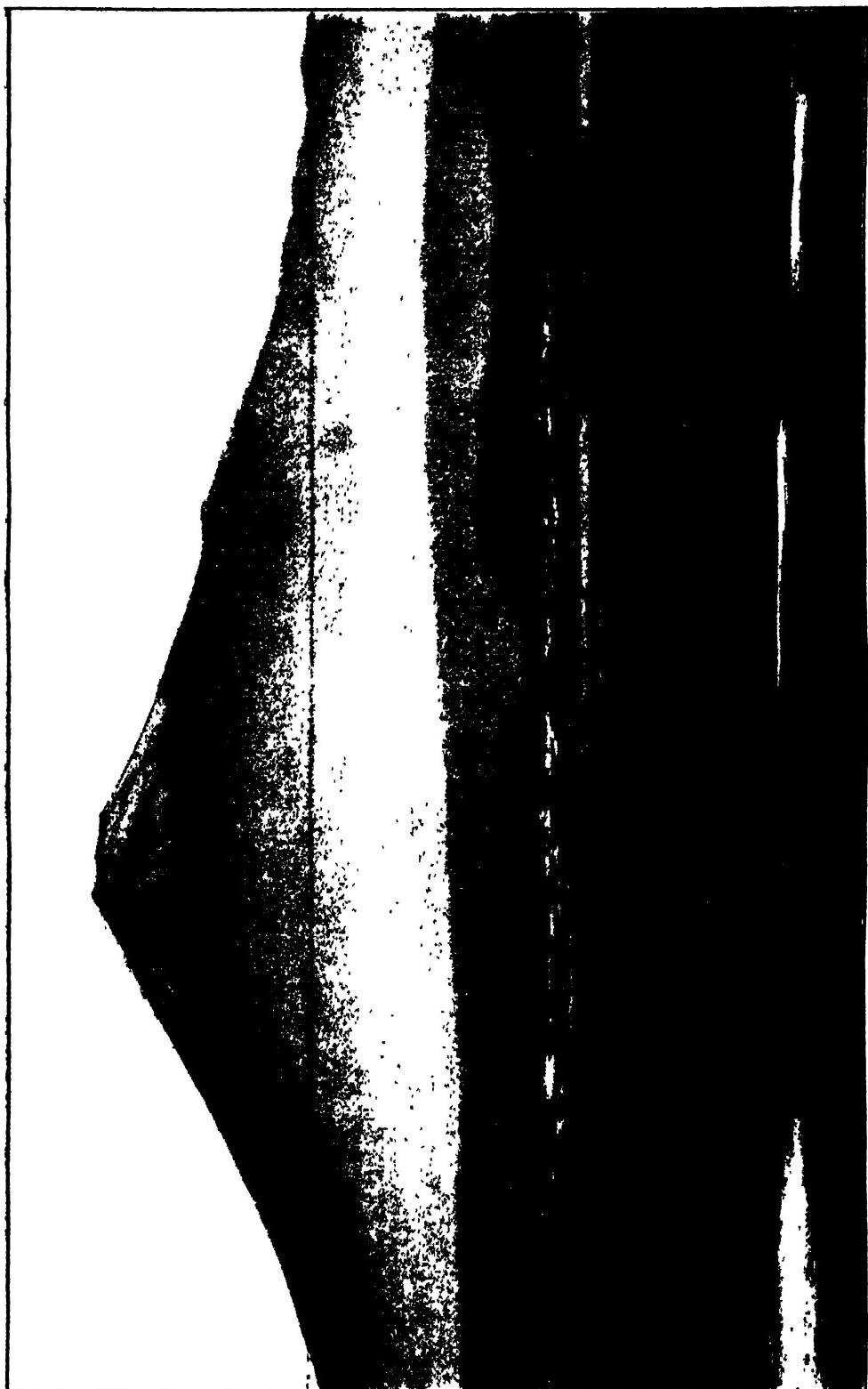
Ethnology.—The Japanese may be regarded as belonging to the great Mongolian family of peoples (apart from the Ainos of Yezo, who are of different race). They are of middling size, and generally of a yellow color, though some are brown and others nearly white. Their eyes are small, oblong, and deeply sunk in the head. Their noses are short and thick, and their hair thick, black, and glossy. The people of rank have generally fair complexions, and ladies who are not exposed to the sun have sometimes perfectly white skins and blooming cheeks. The men are vigorous and active, and the women well formed and graceful, while both sexes exhibit a higher degree of intelligence than is common among Asiatic nations. Apart from member of the imperial family, they are now divided socially into three classes: *kwasoku* or nobles, *shizoku* or knights, and *heimin* or common people; and the classes are kept distinct, with all the strictness of caste. Till 1868 feudalism prevailed in Japan, and the chief nobility

were feudal princes called *daimios*. The nobles are now divided into five ranks, corresponding with prince, marquis, count, etc. Among the chief moral characteristics of the Japanese are perseverance, courage, and frankness, with good-humor, natural politeness, and a large measure of self-confidence. The agricultural population, in particular, are distinguished for their industry, temperance, and courteous hospitality. Polygamy is not permitted, but the power of divorce on the part of the husband is limited only by the requisition that he shall provide in a suitable manner for the support of the repudiated wife; though in case she is divorced for barrenness, or for other reasons recognized by the tribunals as sufficient, she has no claim upon the husband for maintenance. Under no circumstances whatever can a wife demand to be separated from her husband. Legal concubinage was abolished in 1880. Prostitution is permitted by law, and is not deemed particularly disreputable. The courtesans or geishas are destined to their trade from infancy, and, being generally well educated and accomplished, are often selected as wives by respectable men. A singular custom among the women is that of blackening their teeth and shaving or pulling out their eyebrows when they are married. Married women also tie their girdles before, and single women behind. The Japanese of all classes are remarkably cleanly in their houses and persons. They bathe frequently, and there are many public bath-houses in the towns open to all comers for a fee generally equal to the 8th of a cent, where the sexes, prior to its legal prohibition in 1880, bathed together entirely nude, without apparently the slightest idea of impropriety.

Population.—On 31 Dec. 1899, the population of Japan amounted to 44,200,604, showing an annual increase in six years of 1.14 per cent. In 1898 the population consisted of 22,073,896 males and 21,689,257 females, divided among the various classes as follows: the 53 members of the imperial family not being included: 4,551 *kwazoku* or nobles, 2,105,608 *shizoku*, or knights; 41,648,166 common people, including 17,573 Ainos in Yezo. Also included in the population were 123,971 Japanese resident in foreign countries, of whom 90,146 were in the United States or in United States colonies. On 31 Dec. 1900, there were 12,664 foreigners in Japan, of whom 6,901 were Chinese, 2,063 English, 1,475 Americans, 554 Germans, 470 French, 176 Portuguese, 71 Dutch, 189 Russian, 89 Swiss.

Sociology.—The ordinary dress of both sexes and of all ranks is very similar in form, differing chiefly in the colors, fineness, and value of the materials, those of the higher orders being generally of silk, and of the lower orders of linen or calico. The dress consists of a number of loose, wide gowns worn over each other, with the family coat of arms woven or worked into the back and breast of the outer garment, and all fastened at the waist by a girdle. The sleeves are very long and wide, and the part of the sleeve that hangs below the arm is made to serve as a pocket. The women usually wear brighter colors than the men, and border their robes with gay embroidery or gold. Upon occasions of full dress a cloak is worn together with a sort of trousers called *hakkama*. Within doors socks are the only covering of the feet. Shoes are worn abroad, of an awk-

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FUJIYAMA, FROM TOKAIJO ROAD.

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ward and inconvenient kind, consisting of soles of straw matting or of wood, which on entering a house are always taken off. Formerly they wore no hats except in rainy weather; and shaved the whole front and crown of the head, forming the rest into a tuft on the bald skull. At the present day, however, although the national costume has by no means been discarded, occidental dress is commonly worn by the upper classes on formal occasions and during the discharge of official duties; and the western method of dressing the hair is almost universally adopted. The women keep their hair very long, and usually wear on their heads numerous costly ornaments of tortoise-shell. Their dress very much resembles that of the men. They screen their faces from the sun by the fan which is carried by all classes, by ladies, priests, soldiers, and beggars. The greatest peculiarity of Japanese costume, however, is the sword, the wearing of which is a mark of rank; it is strictly prohibited to the lower orders. The middle classes carry one, and the higher ranks two swords, which are worn on the same side, one above another.

The Japanese are slaves to custom, and very strict, often oppressive, etiquette. The rules that govern social intercourse are formed into a regular system, and published in books, which are diligently studied at school. Though much has been borrowed from the Western nations in recent times, the Japanese will not be likely to give up many of their manners, customs, and ways of living, their foods and methods of cooking, their lightly-constructed houses, etc. The houses of the Japanese are low, and built of wood. The walls are coated with a cement that gives them the appearance of stone. In the windows the place of glass is supplied by very fine strong paper, which is protected from rain by external wooden shutters. Verandas encircle the houses, and to almost every dwelling, even in the cities, there is attached a garden. Store-rooms or warehouses made fire-proof by copper shutters and a thick coating of clay are numerous in the cities, where private families keep their stock of goods, and private families their valuable effects, as pictures, books, etc. Fires are frequent, and from the combustible nature of the common buildings are often terribly destructive. Conflagrations consuming thousands of houses sometimes occur. It is the custom on the completion of a new dwelling house to give a house-warming, for which purpose the neighbors and friends of the master of the new house send him liberal presents of eatables and drinkables. Tea is a universal beverage, and smoking is general among the men. In a morning call pipes and tea are served to the guests as regularly as pipes and coffee are among the Turks. At the conclusion of the visit sweetmeats are handed to the visitor on a sheet of white paper ornamented with tinsel; these are eaten with chopsticks, and if the guest does not eat the whole, he or she is expected to fold up the remainder in the paper and carry it away. At grand dinners each guest is expected to take with him a servant or two to carry off in baskets the remnants of the banquet. Fish is a general article of diet, and is varied with game, venison, poultry, and all sorts of vegetables, including a kind of sea weed. Food is eaten out of light lacquered bowls and dishes made of papier maché. Feasts

are followed by music and dancing, and are commonly closed by drinking tea and a spirit called saké. Though industrious, the Japanese are eminently a social and pleasure-seeking people, are fond of feasts and frolic, and have frequent national holidays. Music, dancing, and the theatre are favorite amusements with all classes. Mummers, mountebanks, tumblers, conjurers, and all manner of jugglers are seen in the streets of the cities, and are highly popular with the people. Their jugglers surpass those of all other countries. Among their wonderful feats is the formation from pieces of tissue paper of artificial butterflies, which, guided by the motions of a fan, fly about, advance, retreat, appear to sip the honey from flowers, and display all the airs and graces of real butterflies. The ladies of the upper classes spend much of their time in the fabrication of pretty boxes, artificial flowers, pocket-books, and purses, and in the painting of fans and pictures of birds and animals. In fine weather they join with the men in all sorts of outdoor and rural amusements, taking especial delight in fishing on the lakes and rivers, in vessels elegantly fitted up and adorned. The Japanese gentleman is invariably described as a person of pleasing address and most polished manners. Even the commonest people are neat in their persons and scrupulously observant of the forms of politeness. Suicide formerly was common by the fashionable mode of hari-kari or "happy despatch" which was generally committed by cutting open the abdomen by two gashes in the shape of a cross. It was tolerated, if not in some cases approved by the laws, and was common as a means of escaping disgrace or avenging an affront, the adversary as a point of honor being obliged to follow the example. It is now legally forbidden. There are numerous benevolent and charitable institutions throughout the empire, workhouses and foundlings established by local corporations and private persons, while the central government provides funds for sufferers from extreme calamities and grants relief to the indigent, the helpless and friendless.

Education.—Education is almost universal, the poorest and lowest laborers being taught to read and write. The women are educated with nearly as much care as the men, and there are extraordinary facilities for elementary, secondary and university instruction. During 1902-3 the percentage of children of school age receiving the prescribed course of elementary instruction was 90.35 for boys and 71.75 for girls. The total number of elementary schools was nearly 27,000. The number of teachers fell but a little short of 93,000, and the total number of children in the schools exceeded 4,683,000. The percentage of the enrolled pupils who attended daily was 84.61 per cent. The training of male and female teachers for the elementary schools receives careful attention, and the appliances and hygienic conditions of the school buildings are undergoing continual improvement.

There are seven secondary schools, in different parts of Japan, which are intended as preparatory for the universities. There are also a number of special schools in which the direct practical applications of the subjects studied are kept in view. In the Tokio Foreign Languages School, English, French, German, Russian, Ital-

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ian, Spanish, Chinese and Korean are taught. The Tokio Fine Arts School provides five courses of study, including painting, designing, sculpture, architecture and industrial fine arts. The Tokio Academy of Music furnishes complete instruction in both Japanese and foreign music. There are technical schools intended to prepare men to take charge of industrial operations. The agricultural school at Supporo trains agriculturists for the island of Yezo, which is to Japan what Alaska is to the United States. The Tokio Technical School trains managers and foremen of factories, and a similar institution, already fully equipped, has been started in Osaka. Even the commercial aspect of education is not overlooked; the higher commercial school in Tokio has 53 instructors and 666 pupils.

There are in Japan two universities, the Imperial University of Tokio and the Imperial University of Kioto. The former comprises a University Hall and six colleges of law, medicine, engineering, literature, science and agriculture. The college of engineering offers nine courses: civil engineering, mechanical engineering, electrical engineering, naval architecture, technology of arms, civil architecture, applied chemistry, technology of explosives, and mining and metallurgy. In 1903 the total number of resident instructors was 222, and there were 35 assistant professors now studying in foreign countries. The students numbered 2,880, and included eleven foreigners, one of them a native of the United States. The University of Kioto, though founded much later than that of Tokio, includes, besides the University Hall, colleges of law, of medicine, and of science and engineering. The college of science and engineering provides courses in mathematics, physics, pure chemistry, chemical technology, civil, mechanical and electrical engineering, and mining and metallurgy. In 1903 there were 25 professors and 186 students.

There are laboratories for special purposes and many public libraries, and the combination of educational forces exhibits the astonishing progress in education made by Japan within 30 years.

Religion.—The chief religion is that of Buddha, which is, however, exotic and comparatively modern. Another and older faith exists, called Shinto or Shin-Syu. The word *shinto* is equivalent to spirit worship. The Shinto belief supposes the existence of an infinite number of spirits, exercising an influence over the affairs of the world, who are to be propitiated by prayers and the observance of certain rules of conduct, by cleanliness of person, and purity and cheerfulness of heart. The chief of these spirits is the sun, and after him the elements. These are called *Dai Zin*, "great spirits." The inferior spirits, who are very numerous, are chiefly heroes canonized for their worthy deeds or illustrious qualities. The most prominent and popular of these minor deities is *Fatsman*, the god of war, who is an apotheosis of the 16th emperor of Japan. He is supposed to have been born in a supernatural manner, and is universally honored throughout the empire. Although there are a large number of nominal Christians in Japan, it is not believed that Christianity has made many real converts, motives of self-interest — such as the obtaining of a free western edu-

cation in the mission schools — often underlying so-called conversions to the Christian faith. There are no fewer than 12 sects of Buddhists with 32 creeds. Freedom of religious belief and practice when not prejudicial to peace and order is ensured by the constitution.

Judiciary.—A modern system of justice comprising four classes of courts has been established. Throughout the empire (exclusive of Formosa) there are 302 subdistrict courts for all petty, civil, and criminal cases; 49 district courts exercising a more extensive jurisdiction in civil and criminal cases, and a revising jurisdiction over the subdistrict courts; seven courts of appeal from the decisions of the district courts; and one court of cassation in Tokio, the supreme court exercising an appellate jurisdiction over the courts of appeal, and an original jurisdiction in serious crimes against the imperial house and state, and in serious charges against members of the imperial family. Seven judges preside in the court of cassation; five judges in the courts of appeal; three judges in the district courts, one being chief judge, and one judge in the subdistrict courts. A court under the direct supervision of the emperor deals with disputes respecting administrative affairs.

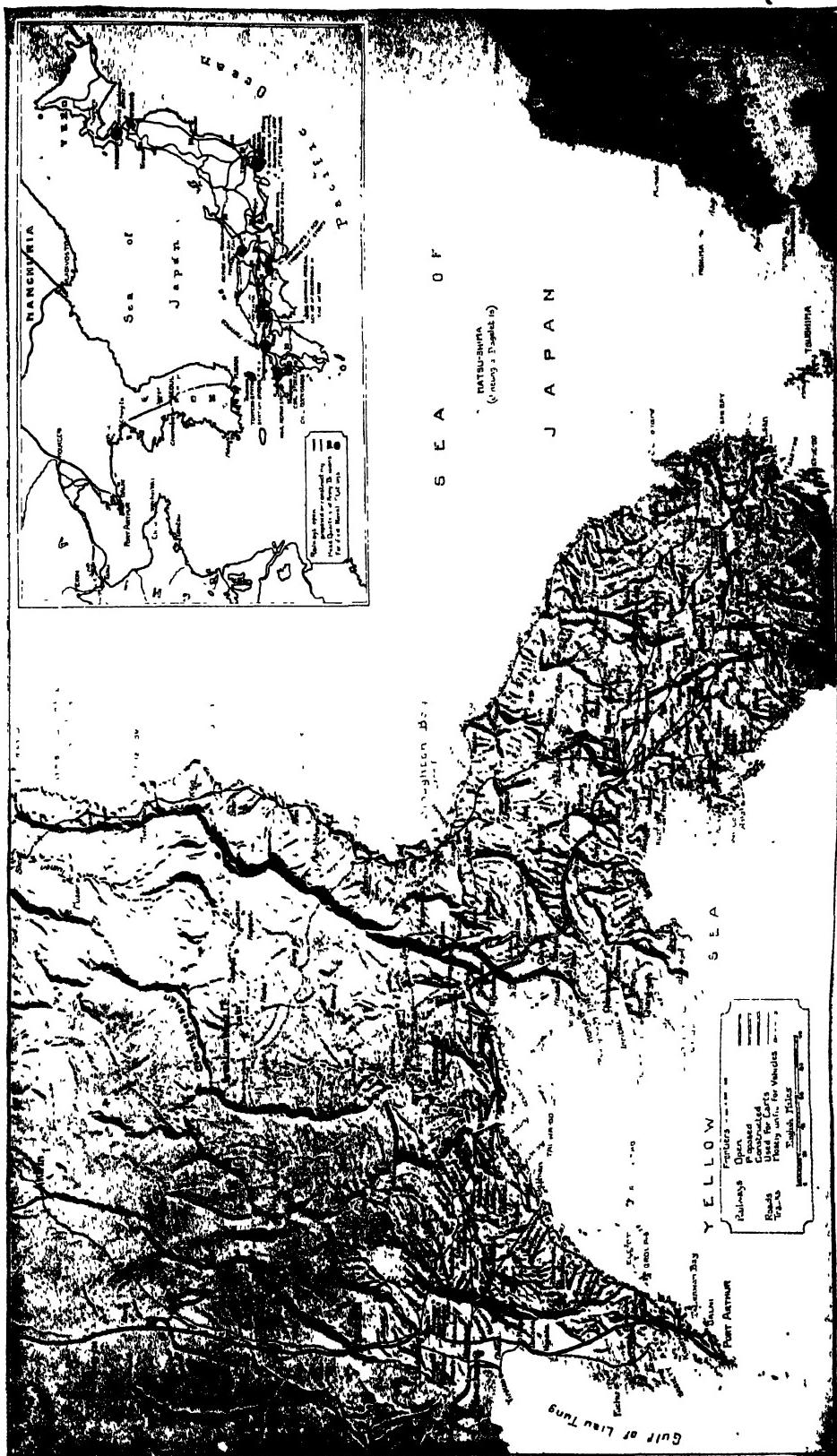
Local Government.—In 1876 a new division of the empire into districts or prefectures for local government was made, namely, 43 *ken* or rural districts, and 3 *fu* or residential districts: Tokio (Yeddo), Osaka, and Kioto. The prefectures are subdivided into *shi* = municipalities, and *gun* = counties; the counties are again subdivided into *cho* = towns, and *son* = villages. The units of local government are village, town and municipality, forming local corporations of the same name; supervising all are the prefectoral governor, assembly and council. Citizenship and electoral qualifications are conferred on all male Japanese not less than 25 years of age who for two years reside in a municipality, town, or village, share its burden, and pay land tax or not less than \$1 direct national tax annually.

History.—The history of Japan, like that of other ancient nations, begins with a mythical period, during which gods and goddesses mingled openly in the affairs of men. The authentic annals of the country commence with the reign of Sin Mu, who was at the same time high priest and emperor, about 660 B.C. He is said to have civilized the people, and to have established laws and a settled government. For many centuries his posterity reigned on the throne he had founded, bearing the title of mikado, and claiming to rule by divine right and inheritance. They were worshipped as gods upon earth, and long exercised the most absolute power. Women were not excluded from the succession, and in ancient Japanese history there are many famous empresses. The most celebrated of these was the Empress Singokogu, who began her reign in the 3d century of the Christian era. She conquered Korea, and gave birth to a son who succeeded her. He was so successful and renowned that at his death he was deified, and is now the Japanese god of war. In this early period a free intercourse appears to have been carried on with China, from which country about the middle of the 6th century Buddhism entered Japan, and was extensively spread among the people. Toward the end of the 7th century the claims of two

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OSAKA CASTLE.



RELIEF MAP OF THE FIELD OF RUSSO-JAPANESE WAR.
FROM A MAP PREPARED BY THE INTELLIGENCE BUREAU OF THE WAR DEPARTMENT OF JAPAN.

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brothers to the throne led to a great civil war, which was ended by the defeat and suicide of the younger. About the end of the 8th century a foreign people of whom nothing more is known than that they were not Chinese, but natives of some more distant country, invaded Japan, and being constantly reenforced from home, maintained hostilities for 18 years before they were entirely expelled. Between the 9th and 12th centuries several new religions were introduced by foreign priests or by Japanese returning from foreign countries. The reign of the emperor Itsu Sio (987-1012) was remarkable for a great epidemic over the whole country, and for the number of learned men who adorned the court. In the reign of Go Rei Sen (1046-69) a great rebellion took place in the province of Osiu, which lasted for five years, and is much celebrated in Japanese literature. Another famous rebellion was headed by Kyomori, a prince of the blood, in the reign of To Ba (1108-24). About the middle of the 12th century, during the reign of the Emperor Kon Yei, the authority of the mikado began to decline. The vassal princes took advantage of the weakness of the imperial government to strengthen their own power, and great confusion ensued. To remedy these evils, the court of the mikado created the office of shogun or commander-in-chief of the army, and appointed to the post Yoritomo, one of the most celebrated characters in Japanese history. He was a young soldier of high birth, related to the imperial family, and was successful and ambitious, so that after quelling the turbulence of the great vassals and restoring the authority of the crown, he contrived to concentrate in his own hands the real power of the government, without, however, depriving the mikado of his nominal rank, dignity, and religious supremacy. The office of shogun was made hereditary in the family of Yoritomo, whose descendants became in fact joint emperors with the mikado. The Mongols having invaded China in 1260 and conquered the greatest part of it, their leader Kublai Khan sent envoys to Japan in 1268, and again in 1271 and 1273, summoning the Japanese government to enter into an alliance with him. The Japanese dismissed the envoys without any answer. The Mongol conqueror, irritated at their insulting indifference to his proposals, sent against them a great fleet and army in 1274, or according to Marco Polo in 1264. This expedition landed in Japan, but was defeated and the army cut to pieces. A still greater expedition was despatched in 1281, and met a similar end, the Japanese sparing only three of the invaders to carry back to China the news of the fate of the rest. Japan from that time to the present has not been molested by invaders. In the 16th century civil wars broke out, and a revolution took place, by which Faxiba, a man of extraordinary ability and energy, originally a private soldier, was raised to the supreme command, and became shogun, under the name of Taiko Sama or Lord Taiko, with the additional title of tycoon, which is now the appellation commonly given to the emperor at Yedo, or lay emperor. He was the first secular monarch who assumed entirely the absolute control of the empire, some share in the government having been hitherto granted to the mikado, who was now reduced to the condition of a merely nominal monarch. Taiko Sama is regarded by the

Japanese as the greatest character in their history, at least since the mythical period, and was eminent not only as a warrior and statesman, but as a legislator. His laws and policy until modern times were observed by the government of Japan, and secured to the nation an almost unequalled permanence of peace and prosperity. The turbulence of the vassal princes, who were then only 60 in number, and were individually powerful, was the chief source of the troubles that had afflicted the empire, and Taiko Sama took the decisive step of reducing their forces by dividing each principality into several. This policy, steadfastly carried out by him and his successors, resulted in establishing 604 distinct principalities and lordships, none of which was of sufficient magnitude to be formidable to the imperial power. It was during the confusion that preceded the rise of Taiko Sama that the Europeans began to be connected with the affairs of Japan. The existence of that empire was first made known to Europeans by Marco Polo, who in his narrative, written about 1298, mentions it under the name of Zipangu, a modification of the Shien-kuo of the Chinese, from whom he had obtained his information. He says: "Its inhabitants have fair complexions, are well made, and are civilized in their manners. Their religion is the worship of idols. They are independent of any foreign power, and governed only by their own kings. They have gold in the greatest abundance, its sources being inexhaustible; but as the king does not allow of its being exported, few merchants visit the country, nor is it frequented by much shipping from other parts." The Portuguese, after Vasco da Gama had doubled the cape of Good Hope in 1497, rapidly extended their discoveries and conquests in southern Asia. In 1542, three Portuguese sailors, who had deserted their ship and taken possession of a Chinese junk, were driven by storms upon the coast of Japan, and to them is ascribed its European discovery. About three years later a Portuguese adventurer, Fernam Mendez Pinto, while cruising with some companions of his own nation in the vessel of a Chinese pirate, was driven by foul weather into a harbor in one of the smaller Japan islands. He was well received, and carried back to the Portuguese settlements in China such a report of the riches and magnificence of Japan that great numbers of traders and adventurers flocked thither, and an active commerce soon sprang up. Missionaries speedily followed the merchants, and in 1549 Japan was visited by the celebrated "Apostle of the Indies," St. Francis Xavier. Both merchants and missionaries were favorably received, and while the one class found a ready and most profitable market for their goods, the other rapidly converted vast numbers of the natives to Christianity. Three of the most powerful of the Japanese nobles, the princes of Bungo, Avima, and Omura, were among the converts. In 1582 the Japanese Christians sent an embassy with letters and presents to Rome to do honor to the Pope, and assure him of their submission to the church. In the two years which followed their return (1591-2) it is said that 12,000 Japanese were converted and baptized. Tempted by the success of the Portuguese, the Dutch East India company in 1598 despatched five merchant vessels to Japan, one of which reached it in 1600. In 1609 other Dutch ships

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arrived, and were well received by the Japanese, who conceded to them the port of Firando for a factory or settlement, with considerable privileges. Before the arrival of the Dutch, who were then at war with Portugal, the Japanese government had become distrustful of the Portuguese, whose astonishing success made them haughty and disdainful of the feelings and prejudices of the natives. Portugal was at that time united with Spain, and a Spaniard, when asked by Taiko Sama: "How is it that your king has managed to possess himself of half of the world?" indiscreetly answered: "He sends priests to win the people; his troops then are sent to join the native Christians, and the conquest is easy." This answer, it is said, made a deep impression on the Japanese government. In 1587 Taiko issued an edict for the banishment of the missionaries; the edict was renewed by his successor in 1596, and in 1597 23 priests were put to death in one day at Nagasaki. The Christians on their part took no measures to pacify the government, but defied it, and began to overthrow idols and pull down heathen temples. This led to dreadful persecutions in 1612 and 1614 when many of the Japanese converts were put to death, their churches and schools destroyed, and their faith declared infamous and rebellious. The Portuguese traders were no longer allowed free access to the country, but were confined to the island of Desima at Nagasaki. In 1622 a frightful massacre of native Christians took place in the neighborhood of Nagasaki, and horrible tortures endured with heroic constancy were inflicted on multitudes in the vain effort to make them recant. In 1637 it was discovered by the Japanese government that the native Christians, driven to despair by persecution, had entered into a conspiracy with the Portuguese and Spaniards to overthrow the imperial throne. The persecutions were renewed with increased rigor. Edicts were issued banishing the Portuguese forever from Japan, and prohibiting any Japanese, or any Japanese ship or boat, from quitting the country under the severest penalties. By the close of 1639 the Portuguese were entirely expelled, and their trade transferred to the Dutch, who, as enemies to the Portuguese and to the Roman Catholic faith, were not involved by the Japanese in their condemnation. In 1640 the oppressed native Christians rose in open rebellion in the province of Simabara. They seized a fortified place, made a long and gallant stand against the imperial troops, and were at length subdued only by the artillery and military science of the Dutch, who were either persuaded or compelled by the Japanese to cooperate against the rebels. The Christian stronghold was finally carried by storm, and all within its walls, men, women, and children, to the number of many thousands, put to death. In the next year the Dutch were ordered to quit their factory at Firando, and take up their residence, under very rigid inspection, in the island of Desima at Nagasaki. There they remained for more than two centuries in undisturbed monopoly of the entire European trade of Japan, notwithstanding occasional efforts of the Russians and English to obtain intercourse with the secluded empire. These efforts were resolutely repulsed, and led in one case to the imprisonment for two years in Japan of the Russian Captain Golownin and several of his companions. In 1852 the United

States government, in consequence of complaints made to it that American seamen wrecked on the coast of Japan had been harshly treated by the authorities of that country, despatched an expedition under the command of Commodore M. C. Perry, who was instructed to demand protection for American seamen and ships wrecked on the coast, and to negotiate if possible a treaty by which American vessels should be allowed to enter one or more ports to obtain supplies and for purposes of trade. In February 1854, Commodore Perry, with a squadron of seven ships of war, entered the bay of Yedo and came to anchor within a few miles of that capital. During the previous year he had entered the same bay and delivered to the Japanese a letter to the emperor from the President of the United States. On 31 March 1854, after much difficult negotiation, a treaty was agreed upon, dated at Kanagawa, the nearest large town, though really signed at the village of Yokohama. By this treaty the ports of Simoda and Hakodadi were appointed for the reception of American ships, where they can be supplied with wood, water, provision, coal, and other requisite articles, and protection and assistance were guaranteed to shipwrecked seamen. Liberty to trade under certain restrictions was also granted, and an arrangement made for the residence of American consuls at Simoda and Hakodadi. In September 1854, a British squadron commanded by Rear-Admiral Sir James Stirling entered the harbor of Nagasaki, and a treaty was soon concluded between Great Britain and Japan, by which Nagasaki and Hakodadi were opened to foreign commerce. Subsequently the Russians made a similar treaty and obtained equal privileges; and by a treaty dated 9 Nov. 1855, the Dutch in Japan were relieved from most of the restrictions so long imposed upon them at Desima. On 17 June 1857, a new treaty was negotiated at Simoda with the Japanese government on behalf of the United States by Mr. Townsend Harris, United States consul-general for Japan, by which the port of Nagasaki, in addition to those of Simoda and Hakodadi, was opened to American trade, and additional privileges granted to American merchants. In 1858 Mr. Harris succeeded in reaching Yedo, where he concluded a still more favorable treaty. In the same year a British squadron conveyed a British ambassador, the earl of Elgin, to Yedo, where, on August 26, a new treaty was concluded between Great Britain and Japan, by which the ports of Hakodadi, Kanagawa, and Nagasaki were opened to British subjects after 1 July 1859, Nee-e-gata or some other convenient port on the west coast of Nippon after 1 Jan. 1860, and Hiogo after 1 Jan. 1863, and various commercial privileges granted to British merchants. In 1860 a Japanese embassy visited the United States, and in 1861 an embassy was sent to the European courts. The rebellion of 1868 already referred to under the paragraph *Government*, followed on the deposition of the shogun, and the reform movement for modernizing Japanese institutions organized by Iwakura, Okubo, Saigo, and Kido.

This progressive movement was chiefly, if not solely, the result of political foresight. The Japanese at heart are as anti-foreign as their Chinese neighbors; but, unlike the latter, they grasped the fact that western encroachment could only be checked by western methods.

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SCENE ON THE BAY OF YEDDO, JULY 11, 1853.

LIEUT. BENT IN THE MISSISSIPPI'S CRUISER PASSING THROUGH A FLEET OF JAPANESE BOATS.

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When the progressive and sagacious statesmen of Japan perceived that their existence as a nation depended upon meeting the great powers of the West on their own ground, they determined upon a thorough and comprehensive metamorphosis. Not only was the youth of Japan sent to Europe for the purpose of acquiring western sciences, but foreign advisers were called in wholesale to reorganize the army and to instruct the nation in the ways of the West. The first innovation was the construction of a railway in 1869, and since that date an immense railway system has been developed, chiefly for strategical purposes, and latterly with but little assistance from foreign engineers.

The building up of a powerful and efficient navy was one of the first considerations of the Japanese government; and not contented with merely organizing a fleet, they prepared for the chronic industrial warfare, which is the inevitable condition of modern life, by subsidizing the construction and the maintenance of a mercantile marine. Determined to make themselves independent of Europe and America, the Japanese established dockyards and arsenals, at which modern ships and armaments are now turned out under foreign supervision, and frequently by native engineers unaided by Europeans. Although the workmanship attained in the latter case is not, generally speaking, on a level with that of the West, it is admitted that the Japanese are making rapid progress in engineering and ship-building. The problem of education received the early attention of Japanese reformers. Commissioners were despatched to Europe in 1871 charged with the task of mastering the essential points of Western education. On their report an educational code, which has since been frequently revised, was drawn up. The new conditions of life necessitated the abolition of Japan's traditional code of laws, which she proceeded to replace with a legal code borrowed from the West; and to these laws foreigners in Japan since the nullification of extra-territoriality in 1899, are now obliged to submit themselves. Although the native industries may be said to die hard in Japan, the country has undergone during the last few years little short of an industrial revolution. In 1897 Japan adopted a gold currency, and placed herself thereby on a financial level with the civilized powers of the West. Side by side with the modern development of their country the Japanese have preserved a remarkable spirit of patriotism. These reforms were not effected without considerable opposition and several risings of the nobles, who, in consequence of the revolution of 1868, were deprived of their privileges, and to a large extent of their incomes, took place. That of 1876-7, headed by the reformer Saigo, taxed the resources of the government pretty severely before it was quelled. In 1894 war with China broke out, ostensibly owing to disturbances in Korea, over which both China and Japan had long claimed a suzerainty, and which had been a frequent source of friction between the two countries on former occasions. Active hostilities began in Korea, from which the Japanese gradually drove out the Chinese troops. A great naval engagement took place off the mouth of the Yalu River, which separates Korea from China, and the result was entirely in favor of the Japanese, who then pushed their way into

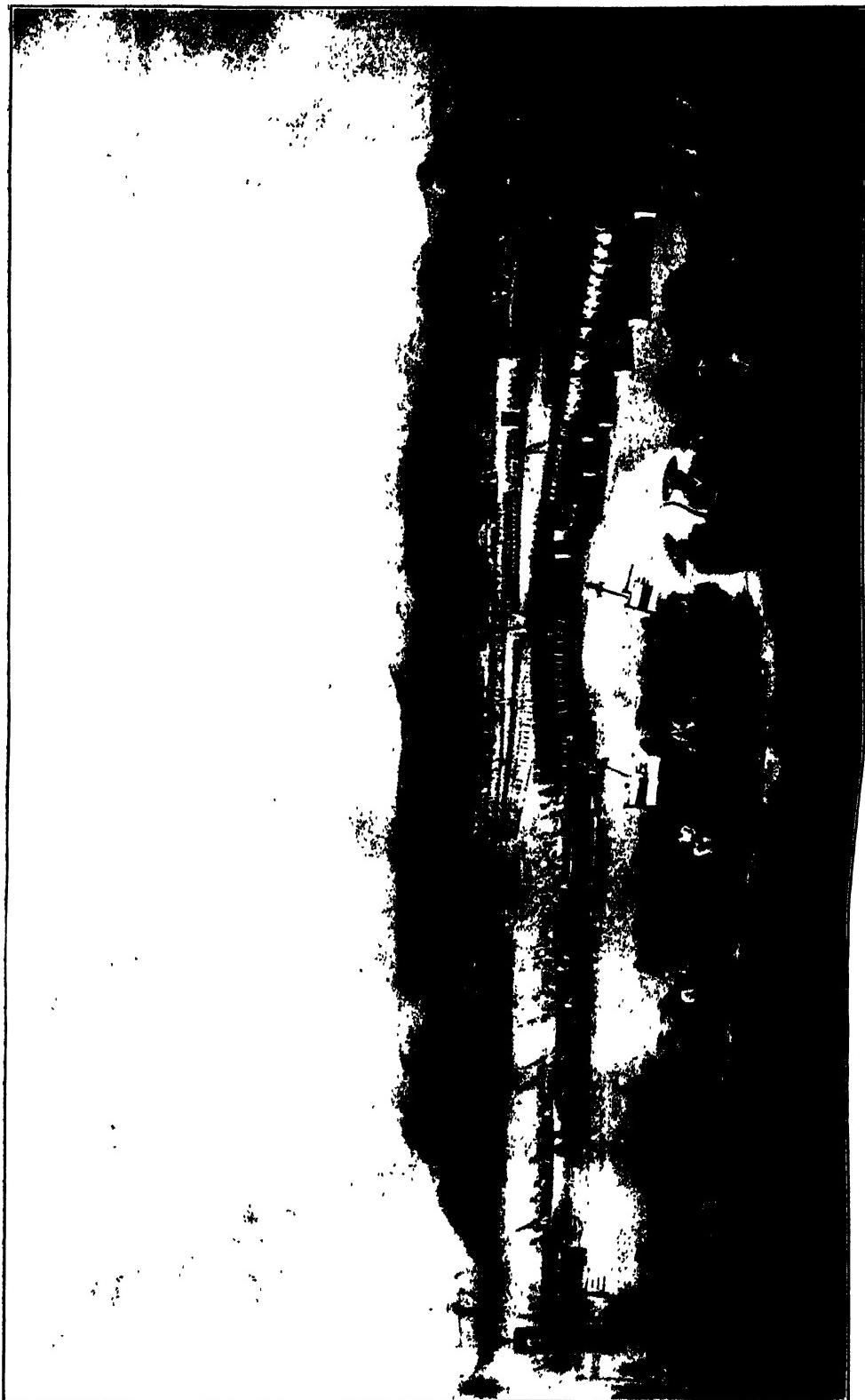
Manchuria, driving the Chinese before them. Further great successes were the capture of the Chinese fortified port and arsenal of Port Arthur, at the entrance of the Gulf of Pe-chee-le of New-chwang, Wei-hai-wei, and great part of the Chinese fleet. China then saw that it was hopeless to continue the struggle, and in March 1895, Li Hung Chang was sent to Shimonoseki to sue for peace. Japan demanded, in addition to a heavy war indemnity, the cession of the Liao-tung peninsula. To these terms China's plenipotentiary ostensibly agreed, but it had been secretly arranged that Russia should step in and forbid the alienation of territory on the mainland. Accordingly Japan found her demands opposed by Russia, France, and Germany, and was compelled to forego the legitimate fruits of her victory. There is no doubt that Japan's primary object in making war was to check the advance of Russia to a threatening position on the mainland of Korea. Her statesmen hoped, by the insistence on Western reform, to make Korea a powerful buffer state between their own country and Muscovite aggression; and since the conclusion of the war there has been a constant—and singularly even—struggle of diplomacy between Japan and Russia for paramount influence in Korea. Instead of the Liao-tung peninsula, the island of Formosa and the Pescadores Islands were ceded to Japan, who was thus obliged to relinquish her design of thwarting Russia's objects in Northern China. A subject which constantly occupied the attention of Japanese statesmen during the 12 years that preceded the war with China was treaty revision. Japan had sacrificed national pride in order to place herself upon an equality with the West, her progress had been serious and genuine, and her statesmen protested against the continuation of extra-territorial privileges which relegated the country to the level of barbarous and uncivilized states. Great Britain was the first power to acknowledge Japan's claims to equality, and in July 1894, a new treaty, which was not to take effect for five years, was concluded by the two governments. Other powers followed suit, and on 17 July 1899, Japan attained her international majority, and will henceforth be treated on an equal footing with the Christian nations of the West. The principal effect of treaty revision has been to abolish extra-territoriality, and to throw open the whole of Japan to the foreigners for purposes of travel, trade, or residence. Whether the fears of the foreign merchants at the treaty ports will prove justifiable remains to be seen; but the fact must not be overlooked that the laws of Japan are founded upon the best codes of civilized countries, and that the future of the Japanese nation is largely dependent, at any rate for the present, upon their cultivating friendly relations with the great powers of the West.

Language and Literature.—Though the Japanese language is grammatically analogous both to those of the Mongolo-Tartaric and Manchu-Tungusic families, it differs radically from them. The Japanese language is not monosyllabic (like Chinese), but agglutinate, and has an alphabet of 47 letters, which are written in two different forms, one rendered complex by the addition of variations, known as the Fira-Kana form of character; and the other, the Kata-Kana character, entirely without variations, and consequently much simpler. Its claim to be akin to

the Chinese is invalidated by the essential characteristics of the Nipponese tongue, which differs from the Chinese as to the etymic import of its elements and in its polysyllabism. The genuine portion of the former is called *Yomi*, while the Chinese supererogation goes under the name of *Koye*. Siebold endeavors to establish genetic connections of the Japanese with various other languages, as for instance with that of the Ainos inhabiting the northern part of the island of Yezo and the southern point of Saghalien (Tarakai); with that in Santam on the coast of Manchuria, south of the Amoor; with those of the Incas of Peru and the Bochicas of New Granada; with that of the Muiscas of Brazil, etc. Although the Korean languages have many features in common with the Japanese, their divergence is radical. The area of the Japanese comprehends the three great islands with some parts of Yezo and other southern Kuriles, of South Saghalien, and also the Loo Choo group of islands, where a dialect or closely related language is spoken. The vernacular idiom differs remarkably from the written, by peculiar terminations, particles, and construction. The written language has also a peculiar style, named *naiden*, for religious and mystical subjects, and another, called *gheden*, for profane composition. There are also two styles of allocution, the one of etiquette, the other vulgar. The speech of women also differs in some particulars from that of men. The *Yomi* is sonorous, soft, and agreeable; almost all words end in vowels, which, however, are often dropped, and in *m* and *n*. Some sounds are of difficult pronunciation to us. A too soft utterance of consonants produces vagueness between the sounds of *p*, *b*, *f*, and *v*; between *s* and the English *z*, *sh* and the French *j*. Although there are no decided *k* and *l*, some Europeans fancy they hear them, while better phonetic authorities credibly assert that they are really *f* and *r* respectively. The initial *r* sounds almost like *dr*. The number of original vocabularies is inconsiderable. Technical terms are generally Chinese, and often much altered. There are two graphic systems. (1) Sinography, somewhat modified. At the request of Ozinteno, the 16th Dairi, Kieu-su-wang (Jap. Kosovo), king of Pe-tsi (Takusai, in Korea), sent Wang-jin (Jap. Vonin), in 285 A.D., to Japan to introduce there the *Tshin-tsé* (Jap. *Sinzi*, China letters), which were afterward named *Han-tsé* (Jap. Kanzi). From that time both the *Tshin-tsé* and the Chinese language became common in Japan; although the former are peculiarly pronounced, as may be seen in the examples within parentheses below. This divergence is, however, scarcely greater than that of the Chinese dialects from the Mandarin idiom. The sinograms of the learned are called *Taf* and *Sso*. With the varieties of sounds there are about 380 Japanized sinograms, beside the unaltered *Tshin-tsé*. The former are explained by the *Kata-kana* (see below); thus: *kekko*, beautiful, by the Jap. *birei*; *mei-fit* (celebrated pencil), fine writing, by *nō-zio*, etc. Sinograms are sometimes pronounced very differently from their proper sounds; thus: *ye* (the 27th Chinese syllable), river, from the sinographic *sin-kiang*; *me* (17th Chinese syllable), woman, sinogr. *nii*. Synonyms are often written with the same sinograms. Prefaces of books are commonly written in sinograms. (2) As these did not

altogether suit the peculiarities of Japanese phonism and grammar, Kibi or Kibi-ko (733), who had been educated in China, selected 47 sinograms, and simplified them into syllabic signs, in analogy with their original sounds. This syllabary was named *I-ro-fa*, from the first 3 syllables, just as our alphabet is named from the first two letters. This Irofa, surnamed *Kata-kana* (half letters or signs), is used collaterally with sinograms, explaining their sounds, and serving beside for the indication of grammatical particles; in the same manner as the Manchu interlinear or marginal letters serve in Chinese texts. This form is called sometimes the writing of men. The 2d Irofa, surnamed *Fira-kana* (expanded letters), was contrived by the celebrated bonzes Comiu and Kobo (774-835), and became so manifold by the licenses of the pencil as to be almost illegible, especially owing to additions by a third bonze, Kiakuso, who added a 48th sign for a nasal sound. This is the cursive writing for daily transactions, sometimes called the writing of women. The 3d Irofa is *Mun-yo-kana* (myriad-leaves-letters, so called from the poem *Mun-yo-sio* by Tatsi-bana-no Moroye, about the middle of the 8th century, containing 10,000 verses), and is almost a sinogrammatic prototype of all the Irofas. The 4th is the *Yamato-kana*, a simple cursive script, which is used promiscuously with all the others. The original idea of the Irofa is Buddhistic and Indian. The varieties of form in all the Irofas are a great impediment to expeditious reading, the difficulty of which is increased by the many ligatures between the letters. Writing and reading proceed in vertical columns downward and from right to left. There are also some other diacritic as well as punctuating signs. The former are two, namely: the *nigori*, which is almost like our quotation mark (""), and indicates that the hard or rough sound of a letter is modified, so as to cause the *ko*, *fo*, *to*, etc., to be pronounced *go*, *bo*, *do*; and the *maru* (°), which indicates tenuification, or hardening, for instance of *fo* into *po*. The marks of punctuation denote also the transposition, repetition, etc., of syllables; they also separate sinograms from Irofas. The order of syllables is as follows: *i*, *ro*, *fa*, *ni*, *fo*, *fe*, *to*, and so on, without any symmetry or analogy. Properly classed, they are: the 5 Latin vowels, *a*, *e*, *i*, *o*, *u*; the labial *f* with these vowels suffixed (*fa*, *fe*, *fi*, *fo*, *fu*); the guttural *k* with the same; the *m* with them; then the *s* with them (and modified by diacritics into *z*, French *j*, Eng. *sh*); then *y*, *t*, *r*, *n*, all with those vowels attached; lastly, two more, *n'a*, *n'e*. The *t* is sometimes *ts*, *dz*, etc. The transcription by Europeans is variable. There is, beside, a kind of metaphor, by which *fō* becomes *fau* and *fafu*; *riō*, *riyau*; *kvo*, *kavau*, *kafau*, etc. This is similar to the Latin *lavō*, *lavatūm* and *lautūm*, *lotūm*; *faveo*, *fautūm*, *fatūm*, *fætus*, etc. Dialectic variations depend chiefly on modifications of sounds; in Yedo, for instance, *r* predominates; elsewhere *f* is pronounced *v*; *fu* like *u*, etc. In the grammar, there is no gender; the male sex is indicated by *vo*, the female by *me*. Substantives do not differ on the whole from adjectives. The latter are often replaced by qualitative verbs or by the particle of the genitive, and are euphonically varied, according to their position; thus, for instance; *akae fana*, red flower; *akashe fanava*,

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FIRST LANDING OF AMERICANS IN JAPAN, JULY 14, 1853.

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red is flower-the; *akovo naru*, red becomes it (as in Magyar *vörössé less*); *aka irono fana*, Lat. *rubri coloris flos*. There is no proper article, but the suffix *va* sometimes determines the acceptation, or shows the French *partitif*; and *sya* signifies "as regards." Cases are indicated by suffixes, as in the following example: *sten*, or *sten-va*, Lat. *cælum*; *sten-no* (oftener *sten-ga*, as in Korean), *cæli*, *sten-ni*, *cælo*, *versus*, and *ad cælum*; *sten-ye*, *in cælum*; *sten-vo*, *cælum*, accusative (also *sten-woba*); *sten-de*, *cælo*, ablative; *sten-yori*, *ex cælo*; *sten-kara*, *de cælo*, per *cælum*, etc. The plural is formed by suffixes, as *tatsi*, *domo*, *ra*, *syo*, which signify all, much, many; or by reduplication, as *fito-bitō*, men, from *fito*, man, with altered initial. The genitive precedes: *fitono yomi*, Lat. *viri arcus*; *anagono*, *fana*, *mulieris flos*. The numerals are various. We give here the Koye in the first place, and within parentheses the Yomi or common ones first, and after them those of days, namely: 1, *itsi* (*nitots'*, *tsuitats'*); 2, *ni* (*fatots'*, *futska'*); 3, *san* (*mits'*, *mika*); 4, *si* (*yots'*, *yokka*); 5, *go*, (*itsots'*, *itska*); 6, *vok* (*mots'*, *muika*); 7, *sitsi* (*nanats'*, *nanuka*); 8, *fats* (*yats'*, *yôka*); 9, *kô* (*kokonots'*, *kokonoka*); 10, *yo*, (*iovo*, *tvovka*), etc. The other Koye are: 11, *syo-itsi* (*10 + 1*); 12, *syo-ni* (*10 + 2*), etc.; 20, *ni-syo* (*2 × 10*); 30, *san-syo* (*3 × 10*), etc.; 100, *fyak*; 1,000, *sen*; 10,000, *man*; 100,000, *vok* (and *rak-sya*, Sanskrit *lak-sha*, a lac); 1,000,000, *teô*; 10,000,000, *kei* (*kotsi*, Sanskrit *koti*). There are 3 sets of figures of numbers. Many particular words are also used in the sense of numerals, as in Chinese. Of pronouns, those of the 1st and 2d person seem to have been lost in the words of etiquette. I, to equals and inferiors, is *vasi*, to a superior, *vatakusi*; we, to equals or inferiors, *vasi-domo*, to superiors, *vatakusi-domo*. There are more than 12 ceremonious quasi-pronouns for the 2d person. The 3d is *ano fito*, this man, etc. (as in Korean). There are many demonstratives. Relatives are wanting, being supplied by participles or understood from the context of the phrases, thus: *vasino miru sto*, Lat. *mei (mih) visus vir*, for *vir quem vidi*; but *vasivo viru sto*, *me videns*, *vir*, for *vir qui me vidit*. The verb is the most perfect part of Japanese speech. *Aru* (to be, or to act), united with nouns, produces many compound verbs. It is affected by many moods, voices, and other logical categories, as in the Altai-Uralic and in many American languages; as for instance: *tata-ku*, Lat. *fer-ire*, *percui-ere*; *tata-keru*, *ferire posse*; *tata-kerareru*, *percuti jubere*; *tata-eteoru*, *percutientem esse*; *tata-kau*, *se muovere ferire*, *pugnare*; *tata-sashereau*, *facere ut inter se pugnent*, *bellum circere*, etc., to a greater extent than the Semitic *kal*, *piel*, *nifal*, *hitel*, *hith-pael*. The suffixes of the tenses are: present, *ru*, past *ta*, future *o*; of negation, *nu*, *zu*. Persons and the plural are indicated by pronouns. The theme of the verb, which is also a substantive noun, is employed without alteration if others follow, and receives the suffixes only when it is not followed by others, or when it is the last word in the phrase. Various euphonic modifications take place in such a combination with the suffixes. Certain particles denote the moods. The participle is of very extensive application, rivaling that of the Greek. Adverbs are like adjectives, as in certain German phrases. The syntax adheres to a strict order, which is: first the subject (nominative), then

the object, attributes, the verb, and the conjunction last. Many of the simple words abound in significations, which must be discriminated by sinograms. Compounds and derivatives are as frequent and easy as in Greek or German. Examples of the former are: *kara-mi*, Lat. *corporis truncus*; *kono-mi*, *arboris fructus*; *futa-no*, *telæ paginæ*; *tsi-sivo*, *pectoris liquor* (blood); *yamabato*, mountain bird, wild pigeon. Derivatives from *stat*, under, below, inferior, are: *stativa*, humility; *statno*, humble; *statni*, humbly; *stat-nisheru*, to humble; *stat-ninaru*, to be humbled; *stat-vonarsu*, to cause humiliation, etc. Other derivatives are: *yomo*, to read, *yomi*, reading, *yomite*, reader; *itamo*, to afflict, *itami*, affliction; *orano*, to hate, *orani*, hatred; *kako*, to write, *kakite*, writer, etc. The following are paraphrases for avoiding ambiguity: *fai-torigumo*, fly-catch-spider, for *kumo*, which means cloud as well as spider; *ine-kari-gama*, rye-cut-scythe, for *kama*, scythe, frog, dish, etc. Many synonyms need explanation, as given in lexicons, where they are determined by sinograms, as for instance *ka-yari-bi*, fire-drive gnats, because each of the three words has different meanings; *kami-fusuna*, a paper cloak, because *kami* signifies paper, god, head, above; *kino-doku*, mind-poison, grief; *ine-bikari*, rye-splendor, lightning; *issun-bosi*, one-inch-bonze, for dwarf, etc. The following are examples of plurisignificants: *in-yen*, cause, banquet; *idsiu*, to inhabit, to leave the house; *kanten*, heat and cold (so in Latin, *altus*, high and deep, *calidus* and *gelidus*, Eng. *coal* and *cool*, etc.). Many Yomi and Koye coincide, others diverge altogether in signification; thus: *kiba*, Japanese, tool, Chinese, cavalry; *kido*, Japanese, city-gate, Chinese, joy, anger, etc. The adoption of Roman script of the English alphabet as a substitute for her ancient system of ideography, is one of the most remarkable and not least important of all Japan's steps toward harmonizing herself with the highest civilization of Europe and America. For several years a knowledge of Roman script has been increasing in Japan among the most highly educated. Now it is proposed by the most influential educational organization in the empire to make the teaching of our alphabet and of our mode of word formation compulsory and universal in the public schools. It seems probable that the government will adopt the proposal, in which case, of course, all private schools will have to do the same, with the result that all the children of Japan will be learning to write and read their own language in English fashion.

At present the great stumbling block in the way of mastering Japanese is the necessity of learning a multitude of different ideographs. Once Japanese words are expressed in letters like our own, the task of learning will become immeasurably easier. It will then also be much easier for the Japanese to learn our language, for of course our alphabetically formed words seem as strange to them as their ideographs do to us. Moreover, it will cause a change amounting almost to transformation in the Japanese mind, or in the linguistic functions of that mind. The Japanese will for the first time regard words not as indivisible integers of speech, but as composite things formed of letters.

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The literature of Japan comprises works of all kinds, histories, geographical and other scientific treatises, books on national history, voyages and travels, moral philosophy, dramas, romances, poems, dictionaries, and cyclopaedias. A collection of the works of their poets, accompanied by short memoirs, has been made, and almost every Japanese is familiar with the best passages of the principal poets, and fond of quoting them in conversation. Many of their novels are said to be interesting, and to exhibit a higher imagination and more truth to nature than is found in the fictions of other Oriental nations. Their dramas, of which the people are passionately fond, are generally founded on national history or tradition, or the exploits, lives, and adventures of Japanese heroes and gods. Some of them are designed to illustrate and enforce moral precepts. Their general tendency is said to be elevating, patriotic, and decorous, though some of them are strongly tainted with the national passion for revenge, and have horrible exhibitions of cruel punishments. The unities are totally disregarded, and the scene shifts from country to country and flies over great spaces of time without much regard to probability. Only two actors are usually upon the stage at the same time, and the female parts are performed by boys, as was formerly the case in Europe. The actor is most esteemed who can most frequently change parts in the same piece, and the leading actors receive very high pay.

Art.—Japan is in every sense an artistic nation. Owing to the timber construction that prevails in the buildings, which are marked by the characteristics of braced uprights, the overhanging curved roof, and an absence of arches, the architecture of Japan presents no very striking features except in the wealth of ornamental detail and brilliant color. The most imposing architectural monuments are various temples of which two of the earliest and finest are the 7th century hondo or chief temple of Horinji, Yamato, and the pagoda of Yakushiji, near Nara. In sculpture and carving, however, their work is fine almost to microscopic detail, while still preserving the big effect. Their statuary, dating from the 8th century, is marked by a vigor and freedom of design which has resulted in a standard of high artistic merit. In their bronze statuettes and in carving in wood and ivory they are unsurpassed. The artists love to represent Japanese life as it exists, and the incidents of every-day life, more especially the comical and grotesque, are worked out in wood with extraordinary skill. But it is by painting, especially, that Japanese art is best exemplified.

In Japan the art of painting is of such ancient date that its origin is shrouded in the mists of antiquity. China, India, Korea, and Persia exercised a notable influence upon early Japanese art, but its history cannot be traced back farther than the 9th century.

In the Japanese dwelling there are no pictures, according to the conventional acceptance of the term, in their place is the kakemono, a gay and pleasing mural hanging, consisting of a strip of silk, satin, or crêpe, painted in a bold design of flowers, birds, or figures. This silk, often of thin or transparent texture, is sized in such a manner that it becomes an excellent vehicle for the retention of transparent washes in India-ink or water-colors.

The kakemono is appropriately framed in bands of rare brocade, gold or silver cloth, or of silk or paper decorated with a painted pattern. The bordering usually harmonizes in design and color with the subject. A glittering golden network is sometimes placed at the top or bottom, a silken fringe or other suitable finish. It rolls up like a map, and is weighted at the bottom with a cylinder of wood, bone, or ivory. From this cylinder sometimes depend handsome tassels of silk or carven ornaments of bronze, bone, or ivory; but these ornaments are admissible only on very expensive examples. When not in use the panel is carefully rolled up, deposited in a box covered with silk or paper, and put away until it is needed.

The kakemono has no determinate dimensions, the size being governed by the whim of the artist, or the space in which it is to be hung.

The kakemono is invariably assigned to the place of honor in a home, and is hung in a receptacle known as the tokonoma. This is a hooded and partitioned recess made of bamboo or some light wood, built at right angles with the wall of the room, and so constructed that it always commands a good light. These panel pictures are changed as often as three times a week, changes being governed by the season, occasion, or rank of company expected. The kakemono is a favorite adornment for the tea-house, the gayest ones being selected for this purpose.

Some of the finest ancient examples are enshrined in sacred temples, many of them being representations of Buddha and the numerous pagan gods worshipped by the Japanese; others are emblematical, consist of holy symbols, and are bordered with the most expensive fabrics.

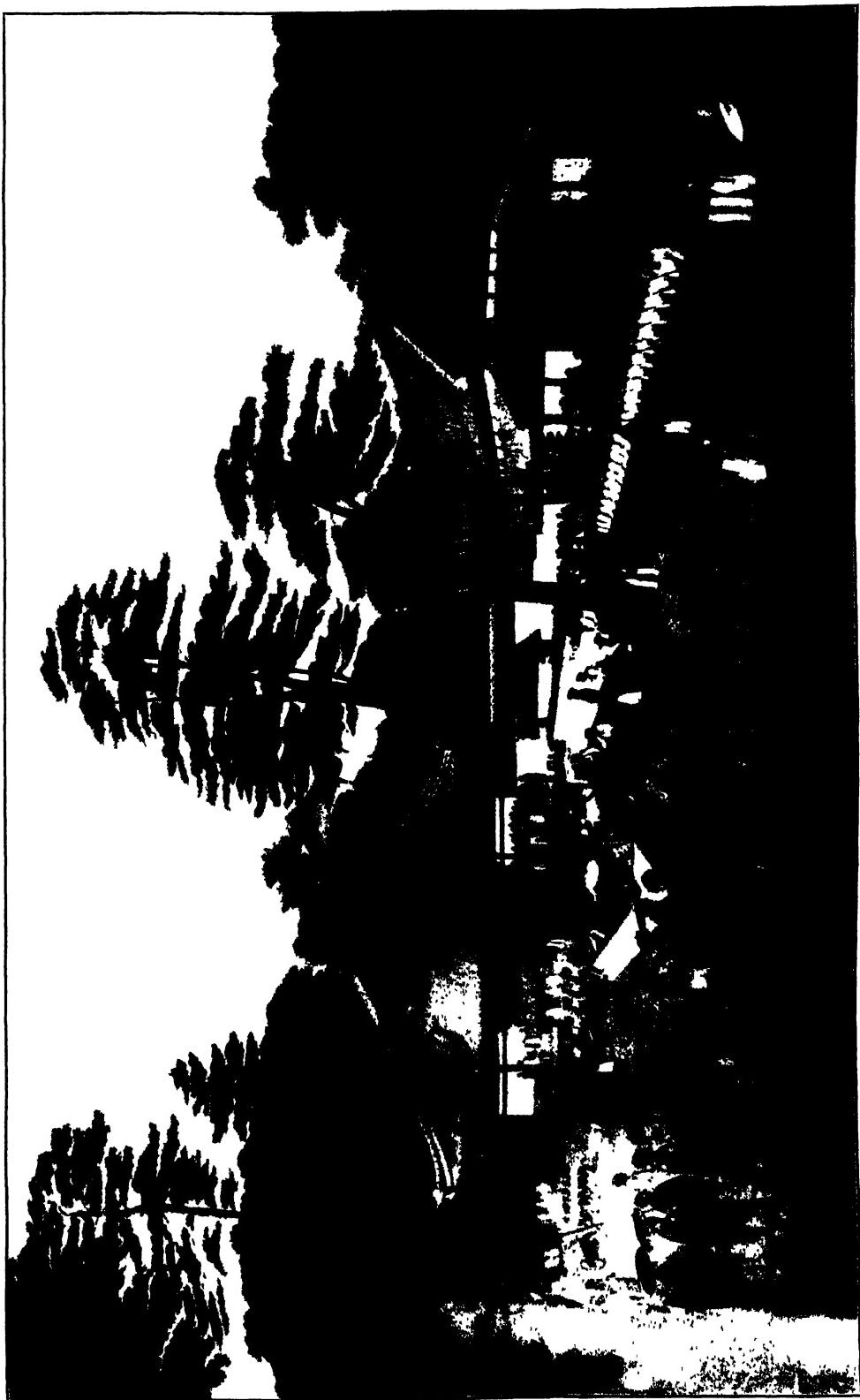
Kosé Kanaoka is said to be the father of Japanese painting; he was the painter and poet-laureate of the imperial court and is regarded as the most eminent artist of antiquity. But few of his works are extant, and they are treasured with such veneration that they are dedicated to the sacred shrines.

Up to the beginning of the 17th century the Japanese painters disdained to reproduce any but heroic and religious subjects. It was not until the 18th century that any paintings portrayed the every-day life of the common people. Four artists soon became celebrated as prominent exponents of this new school of art. Iouasa Matahei was the founder of it, and has presented to posterity the pictorial history of the common people. He shows the peasant laboring in the field, the shopkeeper vending his wares, the artisan plying his various vocations, and the courtesan with her painted cheeks and gorgeous raiment. Hence the kakemonos of Matahei are of inestimable worth to the antiquarian, as they depict with admirable fidelity the manners and costumes of old times.

Motonobou was another able exponent of the realistic school; he began life as an art-embroiderer, and the embellishment of textile fabrics with fine needlework was due to his influence. It was he who created the fashion of the sumptuous trained robe still worn by the women of Japan.

Katsou-Kava was also a realist or impressionist. He devoted his talents to painting scenes from the theatre, and also pictures of women engaged in various occupations, with a smiling landscape or a sumptuous interior for a background. These paintings of picturesque peasant

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AMERICAN SAILORS IN THE TEMPLE GROUNDS, SIMODA, JULY 8, 1854.

JAPANESE ART—JARARACA

girls, these counterfeit presentments of gaudily apparelled actors, are mostly to be found decorating the walls of tea-houses. Katsou-Kava was an able exponent of this school of art, which had many followers; he revelled in brilliancy of color, and under his skilful fingers the saffron yellows, the turquoise blues, and the rich violets were blended into a harmonious ensemble with consummate skill; his figures seemed imbued with life and motion.

Yeisai was one of the most delicious colorists of the latter-day impressionistic school, and is responsible for originating the exaggerated type of female who soon became the fashion in the cities of Japan. Although these exaggerations shock our refined tastes, we cannot fail to admire the voluptuous grace of his women, clad in the sumptuous stuffs that the looms of the Orient alone can produce. Another painter fond of portraying females of the refined aristocratic type was Outamaro, whose women are imbued with a languid sensuous charm. His paintings greatly resemble those of the modern French school, and remind one of a mellow rhythmical harmony in music.

Hakousai is undoubtedly the greatest painter, from a European standpoint, that Japan has ever produced, and may justly be compared with the most distinguished painters of Europe. His works are a veritable encyclopædia of dress and customs, but he was pre-eminently the artist of the people, and died unrecognized by the aristocratic classes.

Science.—In science the Japanese cultivated particularly medicine, astronomy, and mathematics. Superstitious prejudices prevented them from studying anatomy by dissection, and they therefore were but little skilled in surgery, but as physicians were able to cope with the most difficult and dangerous diseases. Chemistry also was imperfectly studied, but botany was successfully pursued. Great advance has been made along all scientific lines under the modern regime. As astronomers the Japanese made considerable progress, being well acquainted with the best European treatises either in the vernacular or by translations, and soon equipped their observatories with excellent instruments of native manufacture, and published annually good almanacs, including the calculations of eclipses.

Music.—Japanese music is generally disagreeable to occidental ears, though the people themselves take a passionate delight in it. The use of the samsie or native guitar is an invariable part of female education. Japanese music is almost identical with that of China, having the same scale, and using an invariable common time. It is marked by monotonous melodies, chiefly in a minor key, and by an excessive use of chromatics.

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pon: Archiv für Beschreibung von Japan' (1897). For Russo-Japanese war, see MANCHURIA.

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Japanese (jap-a-nēs' or -nēz') Art. See
JAPAN.

Japanese Deer. See SIIKA.

Japanese Fern-balls. See FERNS.

Japanese Quince, a small species of Pyrus (*P. japonica*), closely related to the typical quince, but cultivated wholly as a flowering shrub, as its small apple-like fruit is of little value. The flowers are large, numerous, early, vary from white to deep crimson, and universally admired.

Japan'ning, the art of varnishing in colors. All substances that are dry and rigid, or not too flexible, as woods, metals, and paper prepared, admit of being japanned. Paper is rarely japanned till converted into *papier mâché*, or wrought into such a form that its flexibility is lost. The article to be japanned is first brushed over with two or three coats of seed-lac varnish to form the priming. It is then covered with varnish, previously mixed with a pigment of the tint desired. This is called the ground color; and if the subject is to exhibit a design, the objects are painted upon it in colors mixed with varnish, and used in the same manner as for oil-painting. The whole is then covered with additional coats of transparent varnish, and all that remains to be done is to dry and polish it. Japanned works are chiefly of iron and tin, such as coal-boxes, trays, tin canisters, etc., which are both rendered ornamental and protected from rust. Much care is necessary to secure a high and equal polish. For a description of the Japanese process see LACQUERING; also see VARNISH.

Japheth, jā'fēth, the second of the three sons of Noah, Gen. x. 1. His descendants peopled Europe and northern Asia. The Armenians, Medes, Greeks, Thracians, etc., were of the stock of Japhet. In Arabian legend he is said to have had 11 sons, each of which was the founder of a nation. Some philologists designate the Indo-Germanic languages by the term Japhetic, thus identifying his progeny with the Aryans; and the patriarch is said by others to be represented by the Japetus of Greek mythology, whose wife was Asia, and bore him a son Prometheus, the founder of civilization.

Japp, Alexander Hay, English editor and author: b. Dun, Forfarshire, 25 Dec. 1839. He was educated at Edinburgh University, and was for several years sub-editor of 'Good Words' and the 'Contemporary Review' and editor of the 'Sunday Magazine.' Several of his works have appeared over various pseudonyms—"H. A. Page," "Benjamin Orme," and others. He wrote: a 'Life of Thomas De Quincey' (1874); 'Thoreau: his Life and Aims' (1878); 'German Life and Literature' (1881); 'De Quincey Memorials' (1885); 'Cuckoos and other Parasitical Birds' (1899); 'Darwin and Darwinism' (1900); 'Darwin as Ethical Thinker' (1901), and other volumes.

Japura, zhā-poo-rā'. See YAPURA.

Jararaca, zhā-rā-rā-kā', a venomous crotaline serpent (*Lachesis jararaca*) of northeastern South America. Compare BUSHMASTER.

JARO — JASMINE

Jaro, hā'rō, a pueblo of the province of Iloilo, Panay, situated on the Jaro River four miles northwest of Iloilo, the provincial capital. It is one of the earliest Spanish settlements in the Philippines, having been founded in 1584; in 1865 it was made an Episcopal see. The river is navigable for native boats and there is considerable trade. Pop. 10,400.

Jarool', an English spelling of the native name of an East Indian tree (*Lagerstræmia Ros-reginæ*). It has large purple flowers, and yields valuable timber.

Jarves, jär'ves, James Jackson, American art writer: b. Boston, Mass., 20 Aug. 1818; d. Tarasp, Switzerland, 28 June 1888. In 1838, in consequence of ill health, he sailed for the Sandwich Islands, and resided for several years in Honolulu, where he published the first newspaper ever printed there, the *Polynesian*. Before returning to the United States he traveled extensively in California, Mexico, and Central America, and subsequently published a 'History of the Hawaiian or Sandwich Islands' (1843); 'Scenes and Scenery of the Sandwich Islands' (1844); and 'Scenes and Scenery in California' (1844). He afterward resided in Europe, chiefly in Florence, devoted to the study of art and engaged in making a collection of old masters which eventually became the property of Yale University. For his services to Italian art the king of Italy made him a chevalier of the Crown of Italy. His later works include: 'Parisian Sights and French Principles' (1855-6); 'Art Hints' (1855); 'Italian Sights and Papal Principles' (1856); 'Kiana, a Tradition of Hawaii' (1857); 'Confessions of an Inquirer' (1857); 'The Art Idea'; 'The Old Masters of Italy' (1861); 'Glimpses at the Art of Japan' (1876); 'Italian Rambles' (1884).

Jar'vis, Abraham, American Protestant Episcopal bishop: b. Norwalk, Conn., 5 May 1739; d. New Haven, Conn., 3 May 1813. He was graduated at Yale in 1761, and in the autumn of 1763 sailed for England, where he was ordained deacon in February, 1764, and priest a few weeks later. He left England in April, and was settled as rector of Christ's church, Middletown, Conn., the same year. In 1797 he became the second bishop of Connecticut.

Jarvis, John Wesley, American painter: b. South Shields, England, 1780; d. 1840. John Wesley was his uncle and sent him in his fifth year to Philadelphia, where his father, a seafaring man, had settled. Jarvis had but little regular art training, but was encouraged by Malbone. He had a studio in New York and painted portraits of statesmen, preachers and soldiers, some of which are in the City Hall, New York, and in the collection of the New York Historical Society.

Jasher, já'shér, Book of, a lost book of the Hebrew Scriptures, twice mentioned in the Bible (Josh. x. 13, and 2 Sam. i. 18), and about which various conjectures have been made. It was most probably a national song-book of post-Solomonic age, whose contents were partly secular, partly religious. From the mention of the book in Joshua and 2 Samuel it has been inferred that the book of Joshua could not have been written before the time of David's lamentation. But this assumes that the book of

Jasher was all written at once, an assumption which in our ignorance regarding it we are not at liberty to make; for the book of Jasher may have been written at different times. The theory of Dr. Donaldson as to its scope and contents, in conformity with which he proceeded to reconstruct it from the fragments which he thought he could trace throughout the several books of the Old Testament, has met with little favor either from English or Continental scholars. See Donaldson, 'Fragmenta Archetypa Carminum Hebraicorum in Masorethico Veteris Testamenti Textu passim tessellata.'

Jasmin, Jacques, zhák zhás-mán (Provençal, JAQUOU JANSMIN), Provençal poet: b. Agen 6 March 1798; d. there 4 Oct. 1864. In his 'Mous Soubenis' (My Recollections) he gives a humorous description of the humility of his origin and of the poverty of his kindred. All his poems and songs are written in the patois of the peasantry on the banks of the Garonne, supposed in its purest state to be identical with the old Provençal, the language of the troubadours. His poetry deserved and acquired more than a local celebrity, and was warmly welcomed not only in Southern France, but throughout the whole of Europe. He was elected a member of the academies of Agen and Bordeaux; the city of Toulouse awarded him a gold laurel; and in 1846 he was created a Knight of the Legion of Honor. The poetry of Jasmin is distinguished by beauty and power, and though his genius inclined him to gaiety rather than to pathos, yet perhaps his most striking and successful passages are those in which he addresses himself to the feelings. His principal works are: 'The Charivari', (1825), a mock-heroic poem; 'Lou Tres de May' (1830), an ode; 'The Blind Girl of Castel Cuillé' (1836), his masterpiece in poetry, which has been translated by Longfellow; 'The Curl-papers of Jasmin' (1835); 'Francouneto' (1842); 'The Two Twin Brothers' (1846); 'Maltro L'Innocento' (1847); and 'La Semmano d'un Fil' (1849). Consult Rabain, 'Jasmin, sa vie et ses œuvres' (1867); Montrond, 'Jasmin, poète d'Agen' (1875); Andrien, 'Vie de Jasmin' (1882); Smiles, 'Barber, Poet, Philanthropist' (1892).

Jas'mine, or Jessamine, a genus (*Jasminum*) of beautiful plants of the olive family, including many cultivated species and varieties. Most of these are shrubs with long twining branches bearing usually compound leaves and panicles of fragrant white or yellow flowers. They are natives principally of the East Indies. The common jasmine (*J. officinale*) has become naturalized in the south of Europe, where it grows eight or ten feet tall, and is practically an evergreen. The oil of jasmine is obtained from *J. officinale* and *J. grandiflorum*, but it is usually imitated or adulterated. *J. sambac* also furnishes an oil in the East; and a very common greenhouse species is *J. humile*.

Several shrubs are called jasmines which are only loosely related to the true jasmine. Thus the red jasmine of the West Indies (*Plumeria rubra*), the source of the perfume frangipanni, is of the oleander family; the Chile jasmine, *Mandevilla suavolens*, is another fragrant species of the same family, widely cultivated, and others might be mentioned. Two of these outside "jasmines" are familiar in the United States, one of which is a native. The Cape jasmine

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(*Gardenia florida*) is a Chinese (not South African) shrub of the madder family, which found its way to England and America about the middle of the 18th century; it is cultivated everywhere in greenhouses, in a double-flowered variety; and it grows out of doors along the southern seaboard, it being the special pride of Charleston, S. C., after one of whose citizens the genus *Gardenia* was named by Linnæus.

The native species is the Carolina or yellow jasmine (*Gelsemium sempervirens*), an exceedingly odorous climbing plant of the family *Loriaceae*, common throughout the South Atlantic States. It is a vine, whose blossoms grow in axillary racemes of from one to six vivid yellow tubular flowers; and "evening trumpet-flower" is a common name. "Early laden, indeed, is the warm air of spring with its delicious perfume. . . . Through woods and thickets it wends its way vigorously and gleams as brightly as does later the Cherokee rose. It is one of the joys of the season." The roots are regarded by the country people as possessed of medical virtues.

Ja'son, in Greek legend, the son of Aeson, king of Iolcos in Thessaly, a hero of ancient Greece, celebrated for his share in the Argonautic expedition, before which he had distinguished himself in the Calydonian hunt. He belonged to the family of the *Aolidæ* at Iolcos, and his instructor was the centaur Chiron, who educated most of the heroes of that time. (For his adventures in the Argonautic expedition see ARGONAUTS.) On his return to Iolcos with Medea as his wife he avenged the murder of his parents and his brother by putting Pelias to death. But he was unable to retain possession of the throne, and was obliged to resign it to Acastus, son of Pelias, and flee with his wife to Corinth. Here they passed ten years, till Jason, wearied of Medea, fell in love with Glauce (Creusa, according to some accounts), daughter of Creon, king of Corinth, married her, and put away Medea and her children. Medea, having revenged herself on her hated rival, fled from the wrath of Jason in her car drawn by winged dragons, the gift of Helios, to Ægeus, king of Athens, after she had put to death Mermerus and Pheres, her sons by Jason. According to some, Jason killed himself from grief; but others relate that, after passing a miserable wandering life, he came to his death by accident. Others say that he was reconciled to Medea, and returned with her to Colchis, where he ruled many years.

Jas'per, William, American soldier: b. South Carolina about 1750; d. Savannah, Ga., 9 Oct. 1779. At the commencement of the revolutionary war he enlisted in the 2d South Carolina regiment, in which he became a sergeant. Subsequently, in the attack upon Fort Moultrie by a British fleet, he distinguished himself by leaping through an embrasure to the ground, under a shower of cannon balls, and recovering the flag of South Carolina, which had been shot off. Governor Rutledge presented him with his own sword, and offered him a lieutenant's commission; this, however, Jasper declined, saying: "I am not fit to keep officers' company; I am but a sergeant." His commander gave him a roving commission to scour the country with a few men, and surprise and capture the enemy's outposts. His achievements in this capacity

seem to belong to romance rather than history and in boldness equal any recorded in the revolutionary annals of the southern States. Prominent among them was the rescue by himself and a single comrade of some American captives from a party of British soldiers, whom he overpowered and made prisoners. At the assault upon Savannah he received his death wound while fastening to the parapet the standard which had been presented to his regiment. His hold, however, never relaxed, and he bore the colors to a place of safety before he died. A county of Georgia and a square in Savannah have been named after him.

Jasper, Ind., town, county-seat of Dubois County; on the Patoka River, and on a branch of the Louisville, E. & St. L. railroad; about 47 miles northeast of Evansville. Jasper is situated in an agricultural region. The chief manufacturing establishments are saw-mills, lumbering and planing-mills, flour-mills, a furniture factory, and a brick-yard. Pop. (1900) 1,863.

Jasper, an impure quartz, less hard than flint or even than common quartz, but which gives fire with steel. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of color. It is found in metamorphic rocks, and often occurs in very large masses. It admits of an elegant polish, and is used for vases, seals, snuff-boxes, etc. There are several varieties, as red, brown, blackish, bluish, Egyptian. Ribbon or agate jasper is jasper in layers.

Jassy, yās'sē, Rumania, the former capital of Moldavia; on the Bahluiu River. The churches and educational institutions are quite noted; the industrial enterprises are few; but the commerce is extensive and important. The chief exports are petroleum, grain, meat, and salt; the chief imports are coal and clothing. It was in Jassy, in 1821, that Alexander Ypsilanti really began the work for Greek independence. About one-half the population are Jews. Pop. (1902) 80,500.

Jastrow, jās'trō, Joseph, American psychologist: b. Warsaw, Poland, 30 Jan. 1863. He was a son of Rabbi Jastrow (q.v.) and came to America in childhood. He was graduated from the University of Pennsylvania in 1882 and has been since 1888 professor of psychology at the University of Wisconsin. He became president of the American Psychological Association in 1900. He has published "Time-Relations of Mental Phenomena" (1890); "Epitomes of Three Sciences" (1890); "Fact and Fable in Psychology" (1900); "Modern Psychology."

Jastrow, Marcus M., American rabbi and lexicographer: b. Rogasen, Posen, 1829; d. Germantown, Philadelphia, 13 Oct. 1903. After the usual rabbinic and academic studies he graduated from the University of Halle in 1854, became a barber in Berlin, and then rabbi at Warsaw. After five years he was obliged to leave by reason of his political opinions, after being subjected to arrest. He was called to the Congregation Rodef Sholen, Philadelphia, in 1866, with which he was connected until his death, within recent years as rabbi *cmeritus*. Besides some monographs and contributions to the press, he is best known for his "Dictionary of the Targumim, the Talmud Babli and Yerushalmi, and the Midrashic Literature," which is nearing

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completion (1903) and is a monument of untiring erudition and broad scholarship.

Jastrow, Morris, Jr., American Orientalist: b. Warsaw, Poland, 13 Aug. 1861. He was a son of the preceding, and coming to Philadelphia with his parents in early childhood, he was trained in the schools of that city, graduated from its university in 1881, and from the University of Leipsic 1884. He has been for many years professor of Semitic languages and librarian of the University of Pennsylvania. He was originally trained for the Jewish ministry, studying for some time at the Jewish Seminary of Breslau, Germany, and was appointed assistant to his father's synagogue, Philadelphia, which position he voluntarily resigned. His published works are: 'Religion of the Assyrians and Babylonians' (1898); 'Two Grammatical Treatises of Abu Zakariyya Hayyug' (1897); 'A Fragment of the Babylonian Dibbarra Epic' (1891); 'The Study of Religion' (1901). He has edited 'Selected Essays of James Darmesteter' (1895). He is a frequent contributor to learned periodicals and to various encyclopædias.

Jatrophæ, jät'rō-fa, a genus of euphorbiaceous plants of the tribe *Crotoneæ*, tropical and chiefly American. They are of interest principally for their medicinal properties, which reside mostly in the seeds. These, in the case of *Jatrophæ curcas*, are called Barbados or physic nuts,—the last in allusion to their purgative power. The so-called jatrophæ-oil is extracted from the seeds of the coral-plant (*J. multifida*) and of the East Indian *J. glauca*, and is used externally as a stimulant. A common species in the southern United States is the spurge-nettle or tread-softly (*J. stimulosa*). Compare MANTHOT.

Jats, jâts, the most numerous of the agricultural population of the Panjab, India, numbering about four and a half millions. They are by many identified with the *Getæ*; and some of the best authorities accept the theory that they are descended from Scythian invaders of India in prehistoric times. Some scholars believe them cognate with the Gypsies (q.v.).

Jaundice, jän'- or jän'dis, a morbid condition arising from the circulation of bile in the blood, with consequent staining of the tissues and a peculiar train of symptoms resulting from the poisoning. The tint of the skin and certain mucous membranes varies from a light yellow to a brownish or saffron hue. Staining of the conjunctiva is first observed, and is most intense. Jaundice, with reference to its origin, may be either obstructive or toxic. The term obstructive means causing a hindrance to the outflow of the bile from the gall-ducts into the intestine, with its consequent absorption into the hepatic vein and general circulation. Not only is the skin stained, but all the secretions as well, the urine becoming dark brown. As no bile is thrown into the intestine, the stools become clay-colored and usually hard. There is frequently distressing cutaneous itching, and other skin-maladies are not uncommon. The blood partially loses its power of coagulation, and the vessels are apt to allow the escape of blood into the tissues, giving rise to purpuric spots. The pulse is usually slow, and the patient somewhat melancholic. In bad cases death may follow a period of convulsions, delirium or coma. The

cause of this obstruction may be anything occluding the lumen of the ducts from within, as catarrh of the membrane of the intestine, where the bile-ducts open, or catarrh anywhere along the course of the ducts; stones or thickened bile may block up some part of the tubes, or they may be occluded from pressure on the outside by tumors, constricting bands, or shrinking of the liver-substance. (See LIVER, DISEASES OF THE.) The toxic form of jaundice is due to the circulation of poisons in the blood which break down the red cells or, more rarely, destroy the liver cells. The jaundice in this form is not so intense, and the other symptoms caused by the poison are of more importance. Many of the infectious diseases, such as influenza, typhoid fever, yellow fever, pneumonia, pyæmia, and acute atrophy of the liver, cause this form. Mineral poisons, particularly phosphorus, act in the same way. Jaundice in the new-born is so common as to be considered a natural condition, and usually lasts but a few days. It is evident from the many conditions that may give rise to jaundice that it must be considered as a symptom, and treatment should be directed to aiding the bodily functions until the exact cause can be determined.

Jauré, Jean Leon, zhōn lá-ōn zhō-rā, French Socialist: b. Castres 1859. He taught at Albi and Toulouse, and in 1885 entered politics and was elected to the Chamber of Deputies from Tarn; at this time he was a moderate Republican. In 1889 he failed of re-election, and returned to Toulouse, where he was active in the establishing of a college of medicine. Becoming a Socialist, he defended the strikers at Carmaux, and in 1893 was again elected to the Chamber, where he became one of the leaders of the Socialists. He failed of re-election in 1898, but was again elected in 1902. When the Socialist Millerand accepted a position in the cabinet, Jauré defended his action, thus opposing Guesde and the *Parti Ouvrier*, but sought at the same time to reconcile the factions. He also took an important part in obtaining a revision of the Dreyfus case. He still holds a position of leadership and influence in the Socialist party of France, and is acknowledged to be one of the best orators in the chamber of deputies.

Java, jā'vā (native, *Siti-Java* or *Yava*, land of millet), an island of Dutch East India; situated between lat $5^{\circ} 52'$ (Saint Nicholas Point), and $8^{\circ} 50'$ (South Cape) S.; and lon. $105^{\circ} 13'$ and $114^{\circ} 39'$ E. The island is bounded on the north by the Java Sea, on the east by Bali Strait, which separates Java from Bali Island, on the south by the Indian Ocean, and on the west by Sunda Strait which separates the island from Sumatra. It extends east and west, declining 15° toward the south. It is about 660 miles long, from 40 to 125 miles wide, and the area, including Madura Island, off the east coast, is about 50,554 square miles. The Indian Ocean, which beats with great force along the south coast, has prevented the formation, on that side, of such alluvial plains as extend along the north coast. From the same cause the south coast is generally unsafe for shipping, while the north affords excellent anchorage at almost all times and places. The south presents a continuous front of crags and rocks, forming the outer edge of an extremely mountainous country; the north is flat and low, and covered in

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many places with mangrove swamps. The chief harbors on the north are those of Surabaya and Batavia; on the south that of Chilatjap, formed by the small island Kambangan.

Topography and Hydrography.—The whole configuration of the island has been transformed by volcanic action. There are at least 50 volcanoes in Java, of which half are active. In the western end of the island they are grouped in a mass and attain a height of 10,000 feet, but in the eastern portion, though more scattered, they are generally higher, one, Semeru, 12,044 feet, being the highest in the island. Among the chief are Salak (7,266), near Batavia, now extinct; Gedé (9,720); Tjirmaj (10,075); Marbabu (10,670); Raun (10,820); Slamar (11,250). Papandayang, in the southwest, destroyed about 3,000 persons in 1772. In 1822 great damage was done by the eruption of Galungung, one of the volcanoes in the western part of the island. In 1686, about 10,000 lives were lost by the eruption of Ringghit, once over 12,000 feet high, but now a low mountain. The eruption of Kloet (q.v.), in 1901, was most disastrous. The eruption of Krakatoa (q.v.) in 1883, was one of the horrors of modern times.

The island is subject to earthquakes, usually not severe. Three earthquakes are known to have preceded and 19 accompanied volcanic eruptions. In 1867 occurred a most destructive earthquake. A low range of non-volcanic hills, about 3,000 feet high, extends along the south coast. The crater of an extinct volcano called Guwa Upas, or the Vale of Poison, about one half mile round, is held in horror by the natives. It is said that every living creature that enters it drops dead, and the soil is covered with the carcasses of deer, birds, and even the bones of men, killed by the carbonic acid gas which lies in the bottom of the valley; but its terrors have been much exaggerated. "In another crater in this land of wonders," says Sir Charles Lyell, "the sulphureous exhalations have killed tigers, birds, and innumerable insects; and the soft parts of these animals, such as the fibres, muscles, hair, etc., are very well preserved, while the bones are corroded and entirely destroyed." Numerous rivers flow from the north and south sides of the mountains, carrying fertility with them, and affording supplies to innumerable artificial water-courses used in irrigation. These streams are generally rapid, shallow, and so encumbered with sandbanks as not to be navigable; so that only two rivers, the Solo and the river of Surabaya, are navigable for large boats; the others are only suitable for proas or canoes of the lightest draught, or for floating down timber from the mountains. The Tji Tarun and the Tji Manuk are navigable a part of the year.

Climate.—Java is considered fairly healthy, but proper care must be taken to avoid the excessive heat of midday and the night air from the marshes. The temperature of the plains and valleys is during the day from 85° to 94° F., and during the night from 73° to 80°. At an elevation of 6,000 feet the thermometer descends to 60°, while the tops of the highest peaks are often covered with ice but no snow falls. The breezes from the water modify the temperature. There are two seasons; the dry from April to October, and the rainy season from October to

April. During the rainy season there is an almost continuous rainfall except for a short time in the morning. The annual rainfall is about 80 inches. The island is not subject to storms which injure life or property, but near the high mountains there are frequently thunder storms.

Geology.—Java is formed mainly of tertiary, though partly of post-tertiary strata; but by volcanic action the arrangement has been much disturbed. Rocks containing fossil invertebrates are common, but the fossils of vertebrates have not been discovered. There are no metallic veins of sufficient length or depth to be profitable for mining; the Bantam coal-mines, in the northwestern part of the island, yield only lignite; sulphur, naphtha, and asphalt are found in several places, and small quantities of salt saltpeter, and magnese. Limestone and marble are in the southern part. Its minerals are not considered of sufficient value to be classed among its natural wealth-producing resources.

Vegetation.—With a temperature ranging from 94° to the freezing-point, a volcanic soil plenteously watered naturally and artificially, it is not surprising that Java should be of astonishing fertility; the range of its vegetation naturally follows that of its temperature, from the palms of the tropics to the mosses of the temperate zone. The coast is fringed with cocoanut trees; behind them the ground rises gently to the foot of the mountain chain, and is completely cultivated. Vast fields of rice, artificially watered, distributed amphitheatrically on the flanks of the hills, yield often three harvests annually. In the same altitude are found the cotton plant, the mangoes, sugar-cane, indigo, palm-trees, and other tropical vegetation. Higher up than the rice-fields the bases of the mountains are covered with vast forests of the fig-tree tribe of different species, remarkable for their great height and vigorous growth. Tea, coffee, fruits, cinchona, sandalwood, mahogany, camphor, bamboo, rattan, and many other forms of vegetation are found in this altitude of from 2,000 to 4,000 feet. These are followed still higher up by the plane-like liquidambars, with their erect stems covered with parasites, also rattans and *Rubiaceæ*, the latter of numerous species, some of them exhaling a very foetid odor. Along the upper limits of the liquidambars about 4,000 feet above the sea, lofty trees are still plentiful; here may be seen *Podocarpus cupressus*, with its lofty straight stem, a tree allied to the yew, and furnishing the best timber in Java; the Dammar pine, rhododendrons, laurels of numerous species, chestnuts, oaks, and several others, magnolias, myrtles, tobacco, maize, potatoes, and other vegetation common to the temperate zones. About 7,000 feet high the vegetation changes its aspect, and mosses appear, which, with heaths, are the principal plants found on the loftier elevations. Before leaving the natural vegetation the famed poison-tree, the chettik or upas (*Antiaris toxicaria*), may be named as a noted Javanese plant. The vast forests likewise claim notice; they are 791 in number, and cover a very extensive surface in 13 of the provinces, and consist mainly of teak. To prevent the waste which was going on, the government has placed them under superintendence,

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and draws from them a large amount of revenue.

Animals.—Including domestic and marine animals 100 kinds of mammalia inhabit Java. In the west part the one-horned rhinoceros is not uncommon; and in the higher districts the royal tiger, panther, and tiger-cat keep the inhabitants in constant alarm by their depredations. The babioussa and two kinds of wild hog form the large game of the island. There are only two species of the ape kind, but they people the forests in countless numbers. Two kinds of lemurs inspire the inhabitants with superstitious fear by their mysterious nocturnal habits; and this island may be esteemed the native seat of the largest bats, some of which measure five feet across the wings. They may be seen suspended from the branches in hundreds during the day, and at night they devastate the orchards and gardens. Two civets are common, and supply a perfume of which the Javanese are passionately fond; the wild ox abounds in the woods; and the buffalo is the only animal used in agricultural labor. The horses are small, but vigorous, and, as in India, are not used for agricultural purposes. Two species of wild dogs and six species of deer are found here. Among the domestic animals are the buffalo, ox, horse, goat and sheep. The ornithology of Java is rich and varied, both in genera and in species. About 300 species of land birds have been found on the island, among them the peacock, partridge, quail, 10 different species of pigeon, 11 species of heron, two of cuckoo, the woodpeckers, the black and crimson oriole, the hornbill, eagle, owl, the brilliant looking, and appropriately named minaret flycatcher, the "swift" (q.v.), and the minor bird so apt in learning to mimic human speech is common. Almost all the known generic groups of rapacious birds are found here in great numbers, and gallinaceous fowls are plentiful. A variety of reptiles are found on the island, among them the python. Insects cover the grounds and plants in countless numbers; but few are distinguished for brilliancy or variety of color, or are remarkable in form. Fish are plentiful in the rivers and along the coast; but those of the rivers are of inferior quality for food. Excellent oysters are abundant on the north coast, and prawns, from which a condiment called trasi is prepared and considered delicious by the natives. Crocodiles from 20 to 30 feet in length inhabit the water courses.

In 1895 there were in Java in all about 2,643,000 buffalos; 2,572,000 oxen and cows; and 485,500 horses.

Occupations and Productions.—The Javanese are almost entirely occupied in agriculture. There is a small class of fishermen on the north coast, and a few artisans in the towns, but the great bulk of the people live directly or indirectly by the cultivation of the land, in which they have made greater progress than any other Asiatic nation except the Chinese and Japanese. The chief crop is rice, of which with the aid of irrigation, industriously and almost universally applied, two crops are raised in a year. Lands that cannot be irrigated are used for growing pulses, oil-giving plants, cotton, sugar-cane, and tobacco; and on the mountain slopes, at an elevation of 2,000 or 3,000 feet, coffee is cultivated.

"In the most fertile parts of Java," says Crawfurd, "and these from the neighborhood of the high mountains are usually also the most picturesque, the scenery is at once agreeable and magnificent, and certainly for grandeur and beauty excels all that I have seen even in Italy, that country which in summer bears the nearest resemblance to Java. In such situations we have mountains 10,000 feet high, cultivated to half their height, the valleys below having all the appearance of a well watered garden, in which the fruit trees are so abundant as to conceal the closely packed villages." The mechanic arts among the Javanese are not so far advanced as their agriculture. About 30 crafts are practised among them, of which the principal are those of the blacksmith or cutler, the carpenter, the sheath maker, the coppersmith, the goldsmith, and the potter. Bricks and tiles are largely made. The carpenters are skilful in house and boat-building. They make vessels of all sizes from 50 tons down to fishing canoes, and under European superintendence build large ships. The ordinary dwellings of the people are built of a rough frame of timber, thatched with grass or palm leaves, and with walls and partitions of split bamboo. The Javanese excel all other nations of the Malay archipelago in the working of metals. They are especially skilful in the manufacture of the national weapon, the kris or dagger, which is worn by every man and boy above 14 years as part of his ordinary costume, and by many ladies of high rank. They make also excellent gongs of brass, and these with other musical instruments of the same metal have long been exported to the neighboring countries. The only native textile material woven by the Javanese is cotton, of which they make only a stout durable calico, and this is purely a domestic manufacture, carried on exclusively by the women. From raw silk imported from China, the silkworm not being reared in Java, a coarse cloth is woven by the women. Paper of the nature of the ancient papyrus is a manufacture peculiar to the Javanese.

The greater part of the agricultural lands of Java is claimed by the Government of the Netherlands and the private estates are principally in the residencies in the western part of the island. The government or the private landowners can enforce one day's gratuitous work out of seven, and in some cases more, from all the laborers on their estates. In 1882 the greater part of the enforced gratuitous labor for the government was abolished in return for the payment of one guilder (40 cents) per head yearly. In 1900 the natives had under cultivation 7,073,036 acres. Prior to 1891, the government raised sugar; but since 1891 the sugar is all raised on private properties and on lands hired by the natives, or on lands held on emphyteutic tenure from the government. In 1900 the number of sugar estates was 191 and in 1901 the yield of sugar was 766,238 tons. The yield of cinchona for 1900 was 1,415 tons; of tobacco, 5,435 tons; of tea, 1,659 tons; of indigo, 180 tons.

Trade and Commerce.—The trade of Java is now large, and what was once a burdensome colony has become one of the principal sources of wealth to Holland. The great bulk of the

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foreign trade is carried on through the ports of Batavia, Samarang, and Surabaya. The principal exports are sugar, coffee, cinchona, indigo, nutmegs, mace, cloves, cinnamon, pepper, tea, rice, cocoa, tapioca, cochineal, cubeb, arrack, tobacco, hides, india rubber, and tin. The exports, in 1900, of sugar, and coffee, nearly all of which was sent to Holland, amounted to nearly \$55,000,000. A large amount of rice is sent to Borneo and China. The principal imports are cotton yarns and cloth, machinery, iron, coal, and woolen goods.

Education.—The Europeans and the natives have separate schools with a slight difference in their methods of government. Ample provisions are made by the government for the education of the natives. There are public and private schools, about 20 schools for girls only, and one normal school for the training of teachers for the natives, and two for the training of teachers for the schools for Europeans and those assimilated with them. There is an agricultural college, a museum, and a fine botanical garden at Buitenzorg, and a gymnasium at Batavia. In science the people have made little progress, possessing only a rude notion of astronomy and a slight knowledge of arithmetic. Their architecture at present day hardly deserves the name, though the country abounds with remarkable remains of temples built many centuries ago by the ancestors of the present inhabitants. Of the other fine arts, music is the one in which they have made the greatest progress. They are passionately fond of it, and have generally good taste. Their melodies are wild, plaintive, and interesting, and more pleasing to the European ear than any other Asiatic music. They have wind and string instruments, but their best and most common instruments are drums and gongs.

Religion.—All religious denominations are allowed perfect freedom in Java. The Javanese are Mohammedans, which faith was established by Arab conquerors in the 15th century and has almost displaced Brahminism and Buddhism, the ancient religions of the country. In 1896, in Java and Madura, there were 19,193 native Christians. In 1900 there were about 100 missionaries working among the natives.

Banking.—The "Java Bank," established in 1828, has a capital of \$2,400,000 and a reserve of about \$480,000. The government of the Netherlands has control over the administration. Two fifths of the amount of credits, notes, and assignats must be covered by bullion or specie. In March 1901, the notes in circulation amounted to \$22,534,000, and the bank operations to \$18,637,200. There are postal savings-banks and other savings-banks have been established. The legal coins are the same as those of Netherlands.

Weights and Measures.—The legal weights and measures are the same as those of Netherlands (q.v.).

Ethnology.—The native population of Java comprises two distinct nations, the Sundese and the Javanese. The Sundese occupy the western end of the island, and are greatly inferior in number to the Javanese, and less advanced in civilization. They speak a distinct language. Both nations are of the Malayan race. They are generally about two inches shorter than the men of the Mongolian and Caucasian races, with round faces, wide mouths, high cheek bones,

short and small noses, and small, black, deep-seated eyes. The complexion is brown with a shade of yellow, and is never black. The hair of the head is thick, black, lank, and harsh, and is either scanty or altogether wanting on other parts of the body. A few short, straggling hairs compose the beard. The people are not active, and make but poor runners or wrestlers. They are described as a peaceable, docile, sober, simple, and industrious people. Mr. Crawfurd, author of 'A Descriptive Dictionary of the Indian Islands,' who lived several years in Java, says: "From my own experience of them, I have no difficulty in pronouncing them the most straightforward and truthful Asiatic people that I have met. The practice of running amuck, so frequent with the other cultivated nations of the archipelago, is of very rare occurrence with them." They are patient, enduring, and easily led when convinced that the orders given are not contrary to the ancient laws and customs of the country, which are held in religious reverence. They are very susceptible of affronts, which they are not slow to avenge with the kris, which is invariably worn, and they are frequently likewise armed with the sabre or pike. The mass of the Javanese take only one wife, but people of quality and wealth take advantage of the latitude allowed by the Koran, and practise polygamy. All, without distinction, are passionately fond of gaming, more especially of cock-fighting.

Population.—Java is one of the most densely peopled countries of the world. The population in 1900 was 28,745,698. The population of the principal towns in Java, January 1900, was:

	Euro-peans	Natives	Chinese	Arabs	Orien-tals	Total
Surabaya...	8,906	121,886	13,035	2,791	326	146,044
Batavia....	8,893	77,700	26,817	2,245	232	115,887
Samarang...	4,800	70,426	12,372	724	964	89,286

The whole population of Java is legally divided into Europeans and persons assimilated with them, and natives and persons assimilated with them. The Europeans and those assimilated with them are generally living under the laws which prevail in Netherlands, while the natives and those assimilated with them observe the customs and laws of India. The division of the population into the two classes mentioned is in accordance with the code which specifies the limits and conditions for legislation in Dutch East India. The governor-general, together with the council, has power to make individual exceptions to the general rule.

Government and Revenue.—The most important feature of Javanese society is the village, which forms a complete body politic, with considerable powers of self-government. Its officers are elected by the people, and are charged with the collection of the taxes and the maintenance of public order. The general government of the island is entrusted to a governor-general, appointed by the king of Holland. He is commander-in-chief of the army and navy, and possesses nearly absolute power. Justice is administered to the European inhabitants by a supreme court at Batavia, and by three provincial courts at Batavia, Samarang, and Surabaya. There are besides these other courts for the Asiatic population. In 1832 Gen. Johannes Graaf Van den Bosch introduced into Java a system of government known as the

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"culture system." In principal, it was based upon the officially superintended labor of the natives, directed so as to produce not only a sufficiency of food for themselves, but a large revenue for Netherlands. This obligatory labor was applied to the culture of coffee, sugar, indigo, pepper, tea, tobacco, and some other products; but at present the labor of the natives is required only for the culture of coffee which is marketed by the Government. By the terms of a bill which passed the legislature of the Netherlands in 1870, the obligatory cultivation of the sugar-cane is now totally abolished.

Java, including the island of Madura, comprises 17 residencies, each governed by a resident, assisted by assistant residents, and other officials. Before receiving government appointments, these officials must first have had examinations. The resident and his assistants, together with a number of native officials, exercise almost absolute control over the province in charge. The native officials are remunerated for their services by salaries or by a per cent on the amount of taxes collected. No law can be enacted or enforced by any governor-general which will conflict with the "Regulations for the Government of Netherlands India," laws passed in 1854 by the king and states-general of Netherlands.

The revenues are derived from the government monopolies of railroads, salt, opium, and from the sale of government products obtained under the "culture system." Other revenues are obtained from taxes on houses and estates, sale of government lands, custom duties, licenses, personal tax, and from a number of indirect taxes. The greatest expenditures are for the general administration, about one third, and for the army and navy another third.

Defense.—The army and navy of Java form a part of the defense of the whole Netherlands India. The army is colonial, and the regular army of Netherlands is not allowed on duty in any part of Dutch East India. The commissioned officers are Europeans, except a few prominent natives to whom honorary offices have been given. One half the non-commissioned officers must also be Europeans. There is a school attached to every battalion, and a military academy on the island of Java, at Meester Cornelis, a place near Batavia.

History.—Ancient Javanese history is written in the still existing magnificent remains of temples and other public buildings, which are plentifully scattered over the island. These attest that the worship of Brahma and Buddha once prevailed in the island under the Hindu empire of Modjopahit, the dismemberment of which was consummated by the Arabs 1478 A.D., by the destruction of a vast capital of that name. Islamism had previously supplanted the rival worship, and had driven their last adherents into the neighboring island of Bali. The island then fell under the dominion of numerous petty chiefs, and was found in that state by the Portuguese, the first European settlers on the island, who arrived in 1511. They were followed in 1595 by the Dutch, who soon eclipsed them. Though their views were at first directed wholly to commerce, the Dutch merchants, like the British East India Company, soon found it necessary to assume the position

of a governing power, and treated accordingly with the native princes, with whom they were frequently at war. In 1811 Java was taken from the Dutch by the British, who, however, restored it after the Peace of 1816, since which time it has remained in their hands. Up till 1825 various portions of the island were still under native princes, who paid tribute to Holland; but in that year a revolt took place, which resulted in the whole island falling under the Dutch sway; although two provinces have been left, but only nominally, under the government of Javanese princes—Surakarta and Jokjokarta. Both princes have a court, nobles, ministers, etc., but are the mere instruments of the Dutch government, by whom they are allowed handsome pensions. Since the close of this war the island has been rapidly increasing in population and prosperity. On 20 Sept. 1859 the Dutch legislature totally abolished slavery in Java. The natives never had slaves, and there never were but a few thousand on the island.

Language and Literature.—It is not certain whether the name of Java be connected with the Sanskrit Javana and Yavana, both of which, beside being related to *Iovia* as names of Greece, also signify (especially the latter) Bactria, Arabia, and other foreign countries, and, moreover, swift, horse, etc.; or whether its etymon be of a different origin. As regards the affinities of the Javanese language, Roorda considers it as a branch of the Malay. Crawfurd derives it from the vernacular of the aborigines, to whom he attributes the primitive culture of the Malayan islands. Domeny de Rienzi supposes it to have arisen from the language of the Bugis of Celebes, by an admixture of Malay and Sanskrit. Humboldt connects it, both as to words and grammar, with the Tagala, the most developed Malayan tongue of the Philippine Islands, as well as with other Malay idioms and with Sanskrit. Others see in it a type of the unmixed tribes of Oceania. It certainly shows all these affinities, and contains also some Arabic elements. The Javanese is the most cultivated of all Polynesian languages, owing to the very early intercourse of the island with the continent of India, whose Aryan as well as Dravidian influence is attested by the presence of Malabaric words along with those from the Sanskrit, not only in Javanese, but also in the idioms of Sumatra, Madagascar, etc. Both religious and political revolutions have served to modify the condition of the languages. There are four dialects, according to Raffles, on the three islands which form the linguistic group in question, namely: (1) The tongue of the mountaineers of Sunda, in the western part of Java, east of Tagal, probably vernacular through this whole region before the introduction of Mohammedanism, now spoken by about one tenth of the population of the island; it contains many Malay and some Sanskrit words, stands in the same relation to the principal language as the Welsh does to the English, and is best spoken at Bantam, sluggishly at Bogor and Chianjore, and verging to the Javanese at Cheribon. (2) The Javanese proper, east of the last named city, extending through the rest of the island, especially along its north shore; its words are long at Tagal, shorter at Samarang, full, short, and strong at the courts of Sur-

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karta in the centre, and Jokjokarta in the south; it approaches the Madurese at Surabaya, and the Balian at Banyu-Vangi. (3) The dialect of Madura and Sumanap, which has many Sunda words, with more of Malay, and with peculiar endings. (4) That of Bali, little different from the general Javanese. This island preserves the ancient letters as well as Brahminism, both expelled from Java in the 15th century. A sort of jargon, analogous to the *lingua franca*, is spoken at Batavia, being a medley of Dutch, Portuguese, Javanese, and Malay. Along with the preceding there are also peculiar styles or idioms of speech, varying in accordance with social position and age, as the *madhjo* (intermediate), between equals; the *basa* or *bohoso-ngoko* (language popular), to inferiors; the *basa-kromo* (language superior), urbane, court idiom, about three fourths of it Sanskrit, used by poets as the speech of gods, heroes, and ghosts. As to locality, there are also two vernacular idioms, namely, the *basa-dalam* of the interior, and the *basa-luar*, spoken along the shores. The Kavi (learned, wise, poet) is the ancient sacred language of Java, and consists of about six parts of Sanskrit, less altered than in the Pali, to four of Javano-Malay. It owes its origin to Brahminic immigration, about the beginning of our era. It is to the Javanese what Sanskrit is to the Hindostanee, and Pali to the Indo-Chinese languages. Declining in the 14th century, it took refuge in Bali, and was imperfectly known by the Panambahan at Sumanap at the time when Raffles was in Java. Passages in the Kavi are sometimes quoted on peculiar occasions, as for instance in fables and dramas; the term itself is employed as a title of works, etc., such as *Sekar-kavi*, flowers of poetry, whence *Sekarini*, a Kavi metre; *Rama-kavi*, the Javanese Rama-yana; *Kavindhra*, principal singer or poet (named *ma-kathā*, narrator, in Tagala). A few specimens of words may show the relation of the Javanese to the common Malay, where the difference, if not specially noted, is sometimes more in the accent than otherwise: *langit*, heaven; *tanah*, earth (Mal. also *benua*, region); *ayer* (Jav. also *banyu*), water; *laut* (Jav. *la-hut*), sea; *dhina*, (Mal. *hari*), day; *bengi* (Mal. *mālam*), night; *lulan* (Mal. *balan*), moon; *terang* (Mal. *trang*), light; *mati*, to die; *lulat* (Mal. *kāsih*), to love; *dara*, virgin; *dhēva* (Mal. *tuhan*), god, lord; *mangan* (Mal. *mākan*, *santap*), to eat; *bāpa*, *pak* (Mal. *pā*, politely *ayal*), father; *ma*, *bok* (Mal. *mā*, *amā*, politely *ibu*, *bonda*), mother, etc. Compounds and derivatives abound, but the latter are more frequently formed by suffixes than by prefixes, in which the Tagala is very rich. There are many contractions into *tr*, *ngr*, *ngr*, with the dropping of short vowels, together with the alteration of the initial sound (similarly to the Celtic), and other variations which obscure the etymic origin, thus: Sans. *nātha*, master, lord, becomes *tata*, order, to reign; Jav. *neda*, to eat, *teda*, food; *nulis*, to write, *tulis*, scripture; *nitik*, to prove, *titik*, proof. The prefix *n* denotes verbs, *t* substantives; other changes are: *nyatur*, to tell, *chatur*, tale; *nyerrat*, to write, *serrat*, writing, etc. The doubling of the first syllable makes verbs, as *tutulung*, to help, from *tulung*, aid; *gagriya*, to dwell, from *griya*, house. The

insertion of *in* is the sign of the passive voice. Substantives are also made by prefixing *pem* (*pen*, *pe*), denoting an agent; thus: *pem-pektō*, carrier, from *pektō*, to carry; *pem-dahar*, eater, etc.; by prefixing *ka*, a sign of the past participle; *ka-bektō*, Lat. *allatum*; by suffixing *n* (*en*, *an*): *bakt-en*, the carrying, *dahar-an*, Lat. *cibus*; and by both prefix and suffix: *ka-dahar-an*, an eatable. Articles, gender, and the dual number are wanting. In the plural, cases are denoted by particles, and also by reduplication, as in the Japanese. The genitive relation is shown by the precedence of the noun or by inserting *ing*. The other relations of case are indicated by means of verbs. The adjective is unchanged after the substantive. Pronominal forms are fewer than in Malay: *kita*, we in Malay, means I in Javanese. The numerals are: (1) *sidshi*, (2) *loro*, (3) *telu*, (4) *papat*, (5) *limo*, (6) *nem*, (7) *pitu*, (8) *volu*, (9) *songngo*, (10) *sepuluh*, (11) *savelas*, (12) *volas*, etc. Ordinals are formed by prefixing *ping* or *kaping*. The figures of numbers are modified letters. The person, number, tense, mood, and voice of verbs are indicated by certain particles. Many verbs and nouns are expressed by the same word, others are distinguished as stated above. The suffixes of the imperative are *o*, *ono*, *en*, *enno*. The following are examples of a verb in various forms: *ningngalli*, to see; passive, *dhipun*, *tingngalli*, *kattinggalan*, etc.; *kula*, *tingngalli*, I have seen; *bade kula tingngalli*, I shall see; *tinningngallam*, to see one another; *sampeyan tingngalli*, see; *kula tingngallana*, that I may see, etc. The construction is as follows:

*Rama kahula kang vonten ing surga, vasta andika dadi
Father our who art in heaven, name thy be
chapieno.*

As regards the shape and employment of letters, the graphic system is derived from the Devanagari, but not as regards their order, which is as follows: *'ha, na, tcha, ra, ka, da, ta, sa, va, la, pa, da, dja, ya, nya, ma, ga, ba, ia, ng'a*. These 20 *Akshara* (letters) are consonants with an adherent *a* in the general language, or *o* at the courts of princes, which, when not suppressed, gives to the syllabarrium the epithet of *lagana*. As many *Pasangan* (consonants) are vowelless, three of them are annexed, the others subscribed to other letters. This peculiar succession of letters must have originated prior to that of the organic scheme of the Devanagari, and it is explained by its signifying: "There were two messengers, disputing, equally courageous, till both died." The *Akshara-Buddha*, being ancient, differ in form from the later *Akshara-gede*. Some Kavi letters are almost like those of the Sanskrit, while the more recent resemble the square Pali. The vowels are called *San-dang'an* (connection), namely, *a*, *i*, *u*, *ɛ*, *ɔ* (almost French *œuf*), *o*, either used as initials or (except *a*) attached to the consonants instead of the inherent *a*. The diacritic signs are analogous to those of the Devanagari. There are also characters for the quasi-vowels *le* and *re*. The writing runs from left to right, each letter being connected with the others in words, and these following one another without any space left between them. Tradition assigns the introduction of writing as well as of Brahminism

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and political institutions to Aji Saya Baya. Palaeography finds a rich harvest in Java, its subjects being distributed in four classes: (1) inscriptions in ancient Devanagari near the ruins of Brambanan and Sinagasari; (2) those in square Kavi letters, from which the cursive are derived, mostly on stone and metal; (3) those in a dialect resembling the language of Sunda; (4) the *Chandra-Sangkala* (light of royal times or dates), which consist in selecting such words, symbolic of numbers, as may also express a fact that is to be recorded. Thus, for instance, the date of the destruction of Majapahit, a fact most important in Javanese history, is thus inscribed (1400, reading from right to left):

Sirna (o) ilang (o) kertaning (4) bumi (1)
Lost and gone (is) (the) work, (pride of the) earth (land.)

The date of certain long graves at Gresik, near the tomb of the princess of Chermai (1313), is thus written:

Kaya (3) vulan (1) pütri (3) iku (1).
Like (to) the moon princess (that) was.

The literature, which is in Kavi, dates from about the commencement of our era, and is rich, especially in legends concerning cosmogony. The subjects of the works are mostly either of a mythical or ethical character. Prominent among the former are: the *Kanda* (Sans. *Khandata*, fragment, section) *Pepakem* (book), or *Sejarah* (history); *Manek-Maya*, a mythical genesis, in which Buddhism predominates; *Vivaha-Kavi* (matrimonial poem), about a *Rasaksa* (evil spirit) who courts a *Vidaduri* (nymph); *Rama-Kavi*, the Javanese *Ramayana*; *Parikesit*, "Arjuna's Grandson"; *Mintaraga*, a poem on Arjuna in the Indra mountain. This kind of composition comes down to the time of Aji Saya Baya. Of the ethical order are the *Niti Sastra Kavi*, in the purest style, of about the 13th century; and *Sruti*, which already alludes to Islam. But the *Brata Yudha* ("Holy War") is an epos mostly on the deeds of Arjuna; being an episode of the *Mahabharata*, in 712 stanzas, with varying rhymes. The *Sastra Menara* is a Javanese imitation of the ordinances of the Indian *Menu*. Indeed, most of the Kavi works are such imitations. Whether mere versions of Sanskrit works have been made or still exist is not precisely known; but there are many Javanese versions from the Kavi. Javanese literature abounds in romantic compositions, mostly of elegiac form. Among these, the adventures of the popular hero Pandji are most prominent. Dramas, and especially puppet shows, called *vayang* (shadows), and with figures of either leather or wood personating heroes, are popular.

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'Java, the Garden of the East'; Van Nooten, 'Fleurs, fruits, et feuillages de l'île de Java'; Veth, 'Java, geographisch, ethnologisch, historisch'; Verbeek and Fennema, 'Description géologique de Java et Madoura'; Wallace, 'The Malay Archipelago.'

Java Almond. See KANARI.

Java Fowl. See POULTRY.

Java Sea, a body of water with Borneo on the north, Celebes on the east, the island of Java on the south, and Sumatra on the west. It borders on a number of other islands, all small. The direct route from Singapore to Australia is through Java Sea; and it is crossed by two approved routes to China, one by Pitt's Passage and the other through the Straits of Macassar.

Java Sparrow, a species of Oriental weaver-bird (*Munia oryzivora*), called rice-bird or paddy-bird by the British in India and China, where it has become naturalized from its original home in Java. It has a poor song but is kept in cages for its beauty and liveliness, and is sold by bird-dealers all over the world. Its colors are slate-blue and black, with conspicuous white cheeks and a swollen rosy bill.

Javary, zhā-vā-rē', a river which has its rise in the northwestern part of Bolivia, flows northwest, then north and northeast into the Amazon River. The greater part of its course of 350 miles, it forms the boundary line between Brazil and Peru. It is navigable from the mouth to the Anahuac Mountains. By treaty between the governments of Brazil and Bolivia, the source of the Javary is the demarcation of the boundary line between the countries.

Javelin, a short and light spear thrown from the hand, and in ancient warfare used by both horse and foot soldiers. The *pilum* of the Romans was a weapon of this description, and was used either to throw or to thrust with. The shaft was 4½ feet long, and the barbed iron head was of equal length, but as it extended half way up the shaft, the whole length of the weapon was nearly 7 feet. The shaft, made of some tough wood, often cornel, was an inch in diameter. The use of the javelin was not confined to the Roman legionaries, for many barbarous tribes, and especially the Goths, employed this weapon in their military operations.

Jaws, Anatomy of the. The upper jaw is formed by the union of the two superior maxillæ; these bones each form part of the cheek, the outer wall of the nasal cavity, the hard palate, and the lower part of the eye-socket. The lower jaw is formed of one bone, the inferior maxilla, which presents a horseshoe-shaped body, and vertical plates of bone ascending from the body posteriorly. The top of these vertical plates is widened into a knob-like end for articulation with the skull.

Dislocation of the jaw may take place during excessive laughter or yawning. The articular knob slips forward and the jaw is held open. Reposition is accomplished by placing the thumbs on the back teeth and making forcible downward and slightly backward pressure until the bone is felt to snap into place.

Fracture of the upper jaw is uncommon except when the face is crushed in. Usually in fracture it is the body of the lower jaw near the front that is broken. Besides the usual signs of fracture (q.v.) the attitude may be character-

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istic; the patient is unable to shut the jaw; and the difference in the line of the teeth may show clearly. Repair of the fracture is facilitated by fastening the upper jaw with a sling-bandage carried around the head, and keeping it so fastened until union is established. During this time the patient is forced to eat liquid foods almost entirely.

Jaxartes, jāk sār'tēz. See SYR DARYA.

Jay, John, American statesman and jurist: b. New York 12 Dec. 1745; d. Bedford, Westchester County, N. Y., 17 May 1829. His father was a wealthy merchant of Huguenot stock, and his mother a daughter of Jacobus Van Cortlandt. His father,—early discovering, to use his own words, that Jay was of "a very grave disposition, and took to learning exceedingly well"—sent him to a school in New Rochelle something like Dotheboys Hall in 'Nicholas Nickleby.' Three years at school were followed by study under a tutor until he entered King's College at 14. He was graduated in 1764, the subject of his oration being the blessings of peace, of which he was to have still keener appreciation. Two weeks later, on payment of £200, he entered the office of Benjamin Kissam, a prominent lawyer of New York, as an apprentice bound to serve five years, the last two years to be devoted to the study of the law. Admitted to the bar in 1768, he soon attained prominence in the profession, forming a partnership with Robert R. Livingston, afterward chancellor of the state, and secretary of foreign affairs. In 1773 he began his public career, as secretary to the Royal Commission to determine the boundary between New York and Canada; and for the following 28 years his public services were constant, varied and of supreme importance to the country so fortunate in being his birthplace. All his duties in the many fields covered by him during his splendidly successful life were performed in a manner indefatigable, zealous and faithful, and with marked ability.

Bound by no ancestral ties to England, and having married in 1774 a daughter of the famous Whig, and Revolutionary Governor of New Jersey, William Livingston, many would suppose that in the conflict impending between the colonies and mother country, Jay's voice, like those of James Otis and Samuel Adams, would have been from the first "still for war." But he was constitutionally so calm and conservative that he was unwilling to be too precipitate in determining upon a change in the mode of government. When, however, the colonists decided that their only safety lay in separation, Jay was found to be as staunch and aggressive a patriot as any, and represented the citizens of New York on the committee to settle the question arising out of the Boston Port Bill. Jay drafted the suggestion of that committee that "a Congress of Deputies from the Colonies in general" be convoked—in fact, the convocation of the Continental Congress. He was a member of that congress, and met with it in Philadelphia on 5 Sept. 1774. Congress at once appointed a committee to "state the rights of the colonies in general," of which Jay was made a member. This committee designated him to draft an address to the people of Great Britain, which was so satisfactory that it was at once reported to Congress, and adopted by it. Jefferson, without knowing who was the author, pronounced it "a

production certainly of the finest pen in America."

Jay was also sent to the 2d Continental Congress, but in the interim devoted himself to shaping the public mind in the direction of obedience to Congress and in hostility to enforcement of Parliamentary taxation. When the 2d Congress convened, the signal shot—"heard round the world"—had been fired at Lexington, and Congress, realizing that a condition of war existed, deputed Jay to draft an address to the people of Canada, which was prepared and adopted, and circulated in that country. He also wrote an address to the people of Jamaica and Ireland by request of Congress, but the second petition to the King that he prevailed upon Congress to make was written by Dickinson. Other important and effective work by him in that general direction might be cited, but I shall be content with the assertion I deem supported by the facts, that as a creator and molder of public opinion at that particular juncture Jay stands unrivaled; and all this was in the main accomplished through the wise use of his pen, the efficacy of which was strongly presented by John Adams when he wrote regarding it to Jefferson, "I never bestowed much attention to any of those addresses, which were all but repetitions of the same things; the same facts and arguments; dress and ornaments rather than body, soul or substance. I was in great error, no doubt, and am ashamed to confess it, for these things were necessary to give popularity to the cause, both at home and abroad." Jay's contribution to the debates in Congress, like all his public work, showed that he followed in all things and upon all questions the path illuminated by the light of his well balanced judgment, and his conscience, thinking not of personal popularity, but simply of the right. He served actively upon the committee that carried on negotiations with foreign powers friendly to America and inimical to England. Indeed, during the year 1775 he was a member of so many committees, each having different and important objects, that it is difficult to understand how he was able to accomplish so much important and laborious work.

If it be asked why so good a patriot as Jay was not a signer of the Declaration of Independence, the answer is, that in 1776, while a member of the Continental Congress, Jay was also elected to the New York Provincial Congress, and the Continental Congress having directed the colonies to each adopt a government, Jay, on the call of his colony, proceeded to New York to take part in the formation of the local government, where he was forced to remain while the Declaration of Independence was being signed. During 1777, and while the war was going on in the vicinity of New York, the Provincial Congress, then styled the Convention of the Representatives of the State of New York, was laboring with exceeding difficulty, the members, as is recorded, performing "all the various and arduous duties of legislators, soldiers, negotiators, committees of safety and ways and means, judges, juries, fathers and guardians of their own families, flying before the enemy, and then protectors of a beloved commonwealth." Yet amid all this turmoil and unrest a constitution was drafted by Jay which was, in the main, adopted as drafted, and was published upon 22 April 1777, by being read in front of

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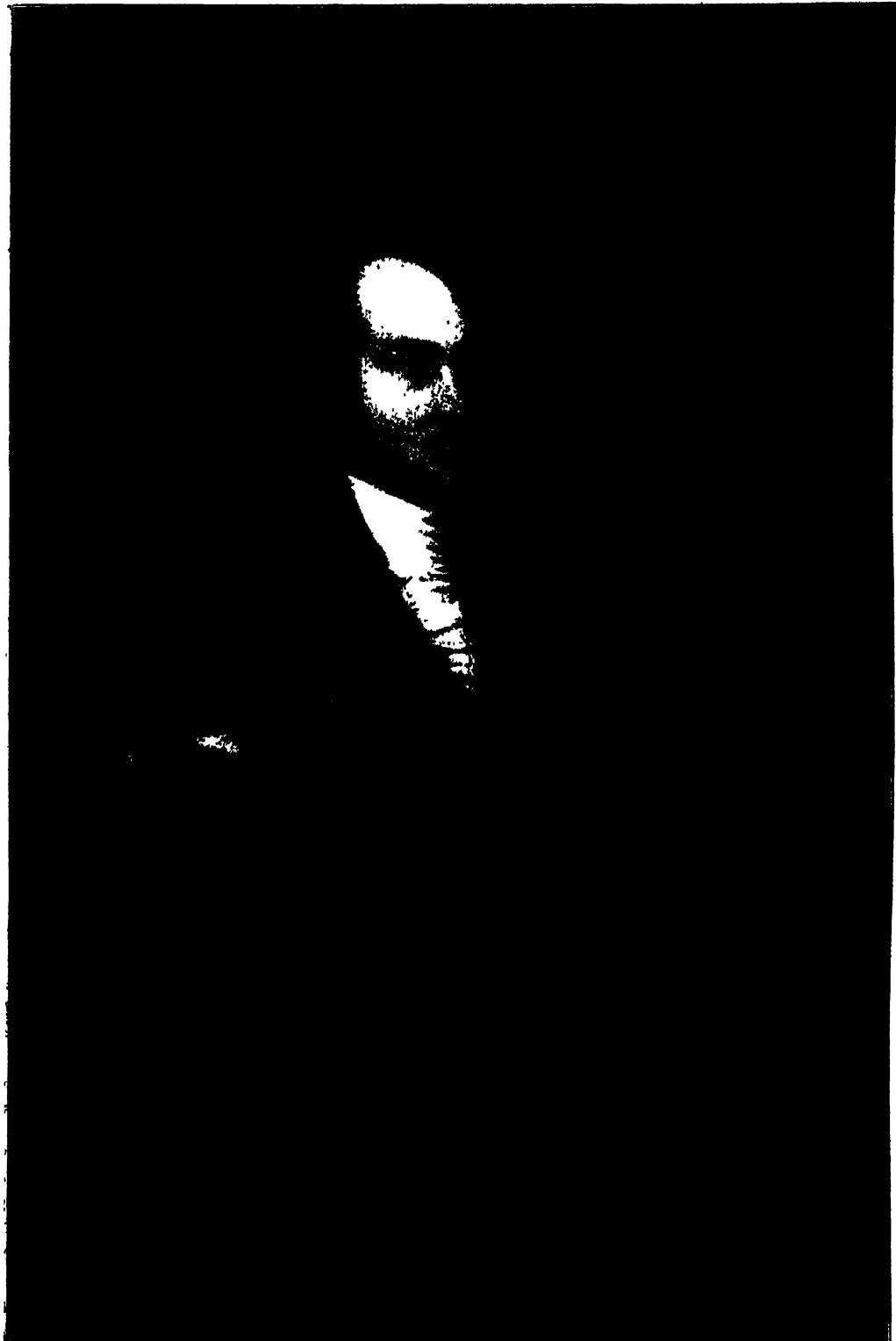
the court-house in Kingston. A committee was at once appointed, Jay being a member, to organize a new government; and a council of safety was created to act until the legislature should meet. Robert R. Livingston was appointed chancellor and Jay chief justice, and the judicial department of government was temporarily organized.

Jay was urged to be a candidate for governor at the first election under the Constitution, but declined. General Clinton was elected over his opponent, General Schuyler, and took the oath of office, it is said, while "clothed in the uniform of the service, standing on the top of a barrel in front of the Court-House in Kingston." On 9 September following, Chief Justice Jay delivered an address to the grand jury at Kingston, which is to be found in the first volume of his correspondence and public papers. The address is a much prized document of revolutionary times, and was, undoubtedly, intended to reach and affect a much larger constituency than the grand jury to whom it was delivered. Of course, in those unsettled days, with the struggle between the old and the new countries raging, but little litigation of importance came before the supreme court, so that during Jay's chief justiceship the work of the court was mainly confined to criminal trials, and the court never sat in banc. During 1778 he was active in the Council of Revision, of which he was a member ex-officio. The legislature in 1779 appointed Jay to Congress without requiring him to vacate the office of chief justice, it being resolved that owing to serious questions between certain States "a special case" obtained under the Constitution. Shortly afterward Congress elected him its president. Later in the year, however, he resigned the office of chief justice, designing, he said, to recoup his failing fortunes. But his desires in that direction were not to be gratified. More than 20 years elapsed before the public he had served so well would submit to be deprived of his services.

In October, 1779, Jay resigned the presidency of Congress to accept the office of minister to Spain. His instructions in part were to secure if possible a commercial treaty with Spain similar to that existing with France, to acquire a port in Spanish dominion on the Mississippi, and to negotiate a loan of \$5,000,000. That his mission was not entirely successful, and was personally disagreeable, was due to the fact that Spain disliked the new nation because it occupied lands formerly held by Spain, and it was apprehended that with increasing strength it might reach out and take more—fears that we know now were not groundless. While minister to Spain, Jay was appointed, with Franklin, Jefferson, Adams, and Laurens, commissioner for a general peace. Their instructions rested on the mistaken theory that France would aid in procuring for us the best possible terms. In June, 1782, Jay joined Franklin, then minister to France, in Paris, and promptly but cautiously entered upon an investigation which disclosed that France had other interests to serve than those of the United States. Possessed of the situation, he boldly entered upon negotiations with England's representative without even consulting his only colleague in Paris, whom he regarded as necessarily embarrassed by his position as minister to France, and his instructions. With firmness, and yet with great tact, he con-

ducted the negotiations alone until joined by Adams, who enthusiastically approved of his action, and so advised Mr. Franklin, who, after consultation, agreed that the negotiations should be concluded without consulting the French court. The result of these most interesting negotiations with England was a treaty by which the United States gained more than Congress had ever ventured to propose. And Jay's part in this great triumph of diplomacy is well summed up in a letter written by his fellow commissioner John Adams to Jonathan Jackson, "a man and his office were never better united than Mr. Jay and the commission for peace. Had he been detained at Madrid, as I was in Holland, and all left to Franklin, as was wished, all would have been lost." When he returned New York gave him the freedom of the city in a gold box, and he found that he had been appointed by Congress secretary of foreign affairs. This office he filled with his usual ability, settling international questions, and advocating the building of a navy, and the organization of a federal government under a constitution. His papers in the *'Federalist'* evidence both his activity and forcefulness in this direction, and his influence contributed in no small degree in bringing New York to the support of the Federal Constitution.

It is said that after the first election of Washington to the presidency he offered Jay the choice of any office in the government, and that he chose that of chief justice of the Supreme Court of the United States, which he justly regarded as the most exalted position next to the presidency; but be that as it may, Washington appointed him to that position, and in his letter to Jay, advising him of the nomination, said, "I not only acted in conformity with my best judgment, but I trust I did a grateful thing to the good citizens of these United States." The opportunity to contribute largely toward the development of the law in this country did not come to him, however. Had it, his success in other fields and his well poised mind assure us that Washington's judgment would have been triumphantly vindicated. Only a few causes came before the court during his incumbency, and the record of those, with a single exception, are preserved only in the minutes of the clerk, but his every step was in the right direction, whether taken while holding a circuit or sitting in banc with associates, and had effect in shaping the foreign policy of the United States as well as in establishing the dignity and independence of the Federal judiciary. He continued to hold the office until he resigned in 1795; but in the meantime and in 1792 the Federalists supported him unsuccessfully as against Governor Clinton for the governorship of New York, and in 1794 President Washington urged him to go to Great Britain as special envoy to settle differences growing out of the failure of that country to keep the obligations of the Treaty of 1784; differences which had aroused a strong war spirit all over the land. It was easy to foresee, as Jay foresaw, that the outcome of the situation would in all probability be unpopular with the people, but he did not hesitate to meet the responsibility that Washington believed he could meet better than any other man, partially because of the reputation he had established in England while negotiating the Treaty of Peace of 1784. A treaty



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JOHN JAY.

CHIEF JUSTICE OF THE UNITED STATES SUPREME COURT, 1789-1795.

JAY

resulted, known on this side of the ocean as "Jay's Treaty," which settled the eastern boundary of Maine, recovered for illegal captures by British cruisers \$10,000,000, secured the surrender of the Western forts still garrisoned by the British, and contained an article about the West India trade. With the exception of the latter article the treaty was approved by the President and ratified by the Senate. But many were not satisfied, and they denounced him with tongue and pen, and even burned him in effigy in Boston, Philadelphia and at his own home, New York. How different was the homecoming from that after the negotiation of the other treaty, when the freedom of the city was presented to him in a gold box, and each one seemed to vie with every other in extending a welcome. In a letter to a friend, Jay said at that time, "Calumny is seldom durable, it will in time yield to truth"; and he bore himself at that time as one having full confidence that he had acted both wisely and skilfully, and expected the people to realize it in time.

He found on his return that he had been elected governor of New York—before the public had knowledge of the terms of the treaty, of course. Before the close of that term, and in April 1799 he was re-elected by a majority so large as to constitute a personal triumph. During this term the statute was passed providing for the gradual emancipation of slaves within the State, then numbering about 22,000. The six years of his incumbency of the office of governor were crowded with interesting legislative and executive events in which he performed his part with that staunch devotion to the public interests which ever characterized his efforts throughout his career as a servant of the public, as is well illustrated by his refusal to be a party to the scheme of certain leaders of the Federalists to secure the electoral vote of New York for the ensuing election. The unexpected result of the spring elections of 1800 assured the Republicans of a substantial working majority on joint ballot, and hence of the Presidential electors under the law as it then stood. It was generally conceded that New York would determine the choice of the next President. Although the Federalists had, in March prior to the elections, defeated the attempt of the Republicans to redistrict the State, and had insisted that it was necessary that the State should act as a unit in the choice of Presidential electors, the leaders changed their position after the election had gone against them, and insisted that the electors should be chosen by districts. Alexander Hamilton wrote Governor Jay on 7 May advising that he call an extra session of the Legislature to enact such a statute before July first, the end of the legislative year. Philip Schuyler also wrote a letter strongly urging that such a course furnished the only means of saving the "nation from more disasters." But Jay, although a staunch Federalist, who had received the votes of New Jersey and Delaware, five votes from Connecticut and one from Rhode Island for the Presidency in the preceding electoral college, refused to take such action, and endorsed on Hamilton's letter these words: "Proposing a measure for party purposes which I think it would not become me to adopt." He refused a renomination for the office of governor on the ground that he now intended to retire from public life, and his purpose was

unshaken by President Adams announcing to him his nomination and confirmation a second time as chief justice of the United States.

For 28 years he had been a good and faithful public servant. To him indeed had public office been a public trust, in which he had toiled faithfully and intelligently, having only in view his duty and the public good, unmoved by desire for great emolument or popularity. Naturally conservative he carefully examined every situation before acting, but when he had determined the proper course to take he acted promptly and boldly, and without regard to the effect of his course upon himself. His perfect self poise had its effect upon associates and subordinates, and the value he placed upon it may be inferred from his letter of instructions to William Carmichael in which he said, "Command yourself under every circumstance; on the one hand avoid being suspected of servility, and on the other let your temper be always even and your attention unremitting." This great patriot gave to the public service the day of his vigorous manhood, the best years of his life, covering the period of the struggle for independence and the formation of our complex system of government, the years when his country most needed the faithful service of her sons. He set aside every personal interest, laboring with fidelity and unselfish effort, and showing himself willing to "spend and be spent" for his country. Having borne his portion of travail at the birth, and done his part in the nurture of the early infancy of this great nation, he retired at last to his farm at Bedford, Westchester County, where he lived a restful life, indulging his agricultural, philanthropic and religious tastes, and enjoying the confidence, esteem and affection of the people until he went to his last rest at the age of 84 years, leaving behind him

"A name that shall live through all coming time,
Unbounded by country, by language, or clime."

Consult: 'Correspondence and Public Papers of John Jay' edited by H. C. Johnston (1890-3); William Jay, 'Life of John Jay' (1833); White-locke, 'Life and Times of John Jay' (1887); Pellew, 'John Jay' (1890).

HON. ALTON B. PARKER, LL. D.,
*Chief Judge of the Court of Appeals of the
State of New York.*

Jay, John, American diplomatist: b. New York, 23 June 1817; d. there 5 May 1894. He was the son of William Jay (q.v.) He was graduated from Columbia in 1836, studied law in New York, was admitted to the bar in 1839, became a prominent opponent of slavery, was secretary of the Irish relief committee in 1847, and was counsel for several fugitive slaves. He organized the meetings at the Broadway Tabernacle, New York, in 1854, and took a leading part in the organization of the Republican party at Syracuse 27 Sept. 1855. From 1869 until his resignation in 1875 he was United States minister to Australia, in 1877 was appointed chairman of the so-called Jay commission for the investigation of the New York customs-house administration, and in 1883 was appointed the Republican member of the New York State civil service commission. He was long corresponding secretary of the New York Historical Society, and published several pamphlets, among them: 'The Dignity of the Abolition Cause' (1839); and 'The American Church and the American Slave-trade' (1860).

JAY — JAY'S TREATY

Jay, William, English Congregational clergyman and writer: b. Tisbury, Wiltshire, 8 May 1769; d. Bath, 27 Dec. 1853. After studying for the Congregational ministry, he officiated at Hope chapel, near Bristol, and became pastor in 1789 of Argyle chapel, Bath, where he remained till 1852. As a preacher he not only enjoyed a high celebrity in his own denomination, but won the applause of critics like John Foster, Sheridan, and Beckford. His published sermons are esteemed as well for their catholic spirit as their practical earnestness and simplicity of style. They have passed through many editions, and besides them he wrote 'Essay on Marriage'; 'Lectures on Female Scripture Characters' (1854); 'Morning and Evening Exercises' (1854). His autobiography, in the form of letters, appeared in 1854.

Jay, William, American jurist: b. New York, 16 June 1789; d. Bedford, N. Y., 14 Oct. 1858. He was the son of John Jay, statesman and jurist (q.v.). Graduated from Yale in 1808, he studied law with J. B. Henry at Albany, was obliged by defective eyesight to withdraw from the profession, and became interested in various philanthropic movements, including the anti-slavery cause. He was a founder of the American Bible Society (1816), which he greatly promoted and long defended against High Church attacks led by Bishop Hobart. In 1818-21 he was judge of common pleas in New York, and in 1835-7 corresponding foreign secretary of the American Anti-Slavery Society, in the drafting of whose constitution he had assisted. He wrote much on anti-slavery, and was recognized as a leader of the more conservative of the Abolitionists. Among his publications were: 'The Life and Writings of John Jay' (1833); 'An Inquiry into the Character and Tendency of the American Colonization and American Anti-Slavery Societies' (1834); 'A View of the Action of the Federal Government in Behalf of Slavery' (1837); 'War and Peace' (1848).

Jayhawk, a name originating in Kansas during the slavery and anti-slavery warfare; applied to a few Free State men who organized a system of retaliation against pro-slavery outrages. Gov. Lane of Kansas, in 1861, declared that "the people of Kansas were neither thieves, plunderers, nor jayhawkers."

Jays, a group of birds forming with the magpies a sub-family (*Garrulinae*) of the *Corvidae*, or crow family. They are readily distinguished from the true crows (*Corvina*) by their relatively short wings, long conspicuous tails, and usually showy plumage, in which blue colors are prominent. They are generally smaller than the crows, have weaker bills, and feet better adapted to the more completely arboreal life which they lead. Jays are found throughout the greater part of the world, but America leads in number and variety of species. North America has four genera and ten species with many additional local varieties. A familiar representative is the bluejay (*Cyanocitta cristata*), which is numerous throughout the eastern half of the United States and Canada. It is about one foot long, of which the tail is nearly half; the head conspicuously crested; purplish-blue above with a slight tinge of the same color on the generally gray underparts; the wings and tail are a

nearly saturated blue in the males, duller in the females, cross-barred with black and with white markings especially conspicuous on the end of the tail; a rich black collar encircles the neck. The bluejay eats all kinds of nuts, fruits, large insects, and at times the eggs and young of other birds; it seldom leaves the trees in search of food, and when on the ground hops instead of walking like the crow. Except in Canada it is resident, and it breeds throughout its entire range. The nest, a large structure of twigs, grass, leaves, etc., is built in trees, bushes, or old buildings. Five is the usual number of eggs. Like the magpie this jay is known to collect and hoard various glittering or brightly colored objects, but is chiefly noteworthy on account of the variety and quality of its notes which range from the harshest cries to full flute-like tones. On the Pacific Coast this species is replaced by the darker and duller Steller's jay (*C. stelleri*). The Canada jay, or whiskey jack (*Perisoreus canadensis*) is, as its name indicates, a northern bird, found within the United States only along the northern border, and occasionally breeding in northern Maine. This is a dull-colored gray bird, without a crest, and with soft, lax plumage. It is well known to hunters and lumbermen whose camps it haunts with great boldness; and in manners and voice resembles the bluejay. It nests very early in the spring. Related species are the Oregon jay (*P. obscurus*) and the Siberian jay (*P. infaustus*) of boreal Eurasia. Several species of crestless deep-blue "Florida" jays (*Aphelocoma*) inhabit Florida and the west and the southwest. The brilliant green jay (*Xanthura luxuriosa*) is an example of the gorgeous tropical jays which just enter the United States in Texas. Consult the works: Wilson, Audubon, Nuttall and American ornithologists generally; for western species in particular, Coues, 'Birds of the Northwest' (1874), and 'Birds of the Colorado Valley' (1878).

Jay's Treaty, 1794. The Articles of Confederation provided that the States might nullify at will any provisions of whatever commercial treaty Congress might negotiate; of course therefore no nation with much commerce to be disturbed by our competition would make such treaties with us. Our chief commerce was with Great Britain; and that country would make no commercial treaty whatever with us, even for years after the Constitution had given Congress power to enforce its treaties. There were two main reasons for this: first, that Great Britain had valuable commercial monopolies (especially in the West Indies) for which she thought we could return no equivalent; second, she was angry over the *sequela* of the peace of 1783. She had agreed to surrender the border forts on the Great Lakes, the St. Lawrence, and Lake Champlain, and carry off no negroes, on condition that Congress "recommend" to the States to restore confiscated Tory property, and agree to confiscate no more. Congress did so twice emphatically, but the States paid no attention to it; the British government, though it knew very well how much the recommendation meant, made this an excuse to retain the forts and refuse payment for 3,000 negroes carried off; this in turn hardened the States to refuse compliance with the treaty, and the forts being

THE JAY FAMILY.



1. European Jay (*Garrulus glandarius*).
2. Mexican Long-crested Jay (*Cyanocitta diademata*)
3. Canada Jay (*Perisoreus canadensis*).
4. Blue-capped Jay (*Cyanocorax chrysops*).
5. American Bluejay (*Cyanocitta cristata*).
6. Spanish Jay (*Cyanopica cooki*).
7. Red-billed Jay (*Cissa erythroryncha*).

JEAN PAUL—JEFFERSON

made a basis for Indian outrages winked at by the British commandants enraged the country still more. The Republicans, who sympathized with the new French Republic and hated Great Britain, held the House; the Federalists, whose sympathies were exactly opposite, the Senate by a small majority. On 16 Dec. 1793, Jefferson made a famous report on a House resolution, recommending retaliatory duties; and after an acrid debate the Republicans pushed through a non-intercourse resolution, only defeated even in the Senate by Vice-President Adams' casting vote. But Washington threw his weight into the scale of peace, and nominated Chief Justice John Jay as envoy extraordinary to negotiate a commercial treaty. With Lord Granville he drew up one on 19 Nov. 1794, which removed the chief American grievance by surrendering the forts, but refused compensation for the negroes and referred all other claims to commissioners; and as to commerce, allowed direct but not coasting trade between the United States and the British East and West Indies (the latter in vessels of not over 70 tons), but denied the United States the right to export sugar, molasses, coffee, cocoa, or cotton to Europe—in other words, to become an intermediary for the British colonies to evade the British commercial monopoly; and limited even this provision to two years after peace with the powers then at war with Great Britain. There were also clauses which impliedly recognized British right of search and impressment, and power to make anything contraband. The treaty was ratified by the Senate in secret session (8 June 1795), but when published excited an uproar of public indignation; Jay was burned in effigy, and even Washington vilified incredibly. The Virginia legislature and the Federal House practically passed votes of censure; but the people gradually came to recognize that it was the best thing to be had, hard as were the terms; the commercial bodies in the States openly commended it; Hamilton wrote his "Camillus" letters in its favor; and after a bitter struggle for many weeks in the House to refuse compliance with the Senate action, the treaty won by 51 to 48.

Jean Paul. See RICHTER, JEAN PAUL FRIEDRICH

Jeanne d'Arc, zhan dark. See JOAN OF ARC.

Jeannette, jén-nét'. Pa., borough in Westmoreland County; on the Pennsylvania railroad; about 22 miles southeast of Pittsburg. The natural gas which supplies the borough has contributed somewhat to its development. It is situated in a fertile agricultural region, which is also a coal mining section. The government is vested in a burgess, who holds office three years, and a council. Pop. (1890) 3,296; (1900) 5,865.

Jeannette Expedition, an enterprise, projected 1879 by James Gordon Bennett of the New York *Herald*, who sent out an Arctic expedition from San Francisco in the steamer Jeannette, under command of Lieut. De Long, U. S. N. The Jeannette was early caught in the icepack, drifted for nearly two years, and never escaped from its grip. After the wreck of the Jeannette the crew embarked in two cutters and a whaleboat. Lieut. Danenhower and a portion of the Jeannette's crew reached New

York in May 1882. The bodies of De Long and his men were finally discovered in the snow, with evidences that all had perished from cold and hunger. See POLAR RESEARCH.

Jepp, Sir Richard Claverhouse, English Greek scholar: b. Dundee, Scotland, 27 Aug. 1841. He was educated at the Charterhouse, London, and Cambridge University, and in 1869 became public orator of that university. In 1875 he was called to fill the Greek chair in Glasgow University, which he resigned in 1889, on being appointed Greek professor at Cambridge. He has several times visited the United States, and in 1874 married the widow of a general in the United States army. He was lecturer at Johns Hopkins University, Baltimore, in 1892. His best-known works are: "The Attic Orators" (1876); "Modern Greece" (1880); a "Life of Richard Bentley" (1882); "Homer: an Introduction to the Iliad and Odyssey" (1886); "Lectures on Greek Poetry" (1893); "Humanism in Education" (1899); and an edition of Sophocles, with notes and translation. Since 1891 he has represented Cambridge University in Parliament. He was knighted in 1900.

Jefferson, jéf'er-són, Charles Edward, American Congregational clergyman: b. Cambridge, Ohio, 29 Aug. 1860. He was graduated from Ohio Wesleyan University (Delaware, Ohio) in 1882, from the School of Theology of Boston University in 1887, was ordained to the Congregational ministry in 1887, and became pastor of the Broadway Tabernacle, New York. Among his writings are: "Quiet Talks with Earnest People in My Study"; and "The Broadway Tabernacle of the Past and Future" (1901).

Jefferson, Joseph, American actor: b. Philadelphia 20 Feb. 1829. He was privately educated and was early upon the stage, among his first public appearances being that as a miniature of T. D. Rice in one of the latter's "Jim Crow" entertainments at Washington, D. C. In 1843 he became a member of a band of strolling players that gave primitive entertainments through Mississippi and Texas, and followed the United States army into Mexico. On his return to the United States he appeared at the Arch Street Theatre, Philadelphia, directed the performances at Peale's museum in that city, became known as an excellent stock actor, and in 1851 played Marroll in "A New Way to Pay Old Debts" to the Sir Charles Overreach of Junius Brutus Booth. His prominence began with his creation of Asa Trenchard in "Our American Cousin," in which part he first appeared 18 Oct. 1858, and which eliminated from the stage the traditional caricature of Yankee character. He later appeared in the parts he has since made famous: Newman Noggs in "Nicholas Nickleby"; Caleb Plummer in "The Cricket on the Hearth"; Dr. Pangloss in "The Heir at Law"; Dr. Ollapod in "The Poor Gentleman"; Mr. Golightly in "Lend Me Five Shillings"; Salem Scudder in "The Octoroon"; Bob Acres in "The Rivals"; and, above all, Rip Van Winkle in the play of that name. Dissatisfied with his own dramatization of Irving's sketch, in which he had appeared at Washington in 1860, Jefferson had the play re-written by Dion Boucicault, and in Boucicault's version, with slight changes,

JEFFERSON

has since acted. The drama ran for 170 nights at the Adelphi, London, in 1865, and in the United States was so successful that for years Jefferson appeared there in nothing else. Jefferson's Rip long since established itself as one of the classic creations of the stage, and outside of Shakespeare probably no character has attained so wide and permanent a recognition among the American public. Of late years he has played but a few weeks annually in a repertoire of favorite parts. He also made a considerable reputation as an artist by his impressionist landscapes in oils. His acting method is distinguished by ease, verisimilitude, and perfection of finish. In the plays used by him he has, for artistic purposes, introduced several admirable changes and additions. He published an interesting *'Autobiography'* (1890); and a *'Reply to Ignatius Donnelly on the Shakespeare-Bacon Argument.'* Consult the *'Autobiography,'* and Carroll, *'Twelve Americans'* (1883).

Jefferson, Thomas, American statesman, third President of the United States: b. Shadwell, Albemarle County, Va., 13 April 1743; d. Monticello, Albemarle County, Va., 4 July 1826; student at William and Mary College, Williamsburg, Va., 1760-2; student of law 1762-7; member of House of Burgesses 1769-74; member of Virginia Conventions 1774 and 1775; of the Continental Congress 1775-6; of Virginia Legislature 1776-9; governor of Virginia 1779-81; member of Congress 1783-4; minister to France 1784-9; secretary of state 1790-3; Vice President 1797-1801; President 1801-9; in retirement at Monticello 1809-26.

Early Life.—Thomas Jefferson was the son of Peter Jefferson, a planter of Albemarle County, Va. His mother was Jane Randolph, daughter of Isham Randolph, who was a descendant of William Randolph of Turkey Island, the progenitor of that family so well known in Virginia history. Jefferson's birthplace was Shadwell, about four miles from the city of Charlottesville. At this homestead he resided until it was destroyed by fire in 1770; thereupon Jefferson selected a low mountain about two miles from Charlottesville, where he built that now famous mansion, "Monticello." Albemarle County, Va., has the proud distinction of being the section in which Jefferson was born, reared, lived, died and lies buried. Jefferson's early education, as was usually the case with Virginia planters, was entrusted first to a private tutor, from whom he learned Latin, Greek, French, and mathematics. At 14 his father died, and after two years in a school conducted by the Rev. James Maury, he entered in 1760 William and Mary College, at that time the best institution of learning in America. The student Jefferson is described as tall and raw-boned, with reddish hair and grayish hazel eyes. He was not then regarded as handsome, though in after years he was considered as probably the most attractive in appearance of the great Virginia statesmen. As a youth he was noted for his intelligence, and while at college, he was in constant association with such men of culture as George Wythe (q.v.), the eminent lawyer; Professor William Small, the profound scholar, and Governor Francis Fauquier (q.v.), the gay and accomplished gentleman. With these gentlemen, many years his senior, he was accustomed to discuss the deepest questions of philosophy and

government. In Williamsburg, Jefferson was one of the leaders in all social functions, and always attended the balls given in the Apollo Room of the Raleigh Tavern. Probably his first year at college was spent among too many festivities, but during his second year he is said to have been a most diligent student, often devoting 15 hours a day to his books. After two years of college work, he commenced the study of law under George Wythe, but did not apply for admission to practice before the general court of Virginia till 1767. Jefferson was now 24 years of age; he had a large farm of 1,000 acres (soon increased to 5,000 acres) to which he gave his personal supervision. Though he devoted much time to this farm, he succeeded so well as a lawyer that his profession soon paid him \$3,000 annually.

A Revolutionist.—In 1769 he was returned by Albemarle County a member of the House of Burgesses, an honor which his father had had before him. This was Jefferson's beginning as a statesman. He had stood in 1765 in the hallway of the House of Burgesses when Patrick Henry (q.v.) offered his famous Resolutions against the Stamp Act, and from Patrick Henry he imbibed the spirit of revolution. Just as soon as he became a member of the Burgesses, he joined the party of resistance to England. He was by nature a bold and fearless thinker, and when a mere boy he had had engraved on a seal as his motto, "Resistance to tyrants is obedience to God," a principle to which he held throughout his long and eventful life. Jefferson was present when the House of Burgesses passed the resolutions of 1769. He was one of those who signed the agreement not to import goods from England. He was also a member of the House of Burgesses when, in 1773, it established a Committee of Correspondence between Virginia and the other colonies. Some think that the resolutions for such a committee were drawn by Jefferson, though they were offered in the house by his kinsman, Dabney Carr (q.v.). Of this committee Jefferson was a member. He served again in the House of Burgesses in 1774, and was one of those who voted for the resolution appointing a day of fasting and prayer because of the oppressive measures which England had passed against the city of Boston. When the governor dissolved the assembly, Jefferson met with those discontented members who called for a general congress of the colonies and asked the freeholders of Virginia for a convention to consider the state of the colony. To this convention Jefferson was returned by the people of Albemarle. The convention of 1774 was the first extra-legal assembly to meet in Virginia. Jefferson was unable to be present, having been taken ill on his way to Williamsburg. However, his influence was felt through a document called *"The Summary View of the Rights of British America,"* which was intended to be a series of instructions to the Virginia delegates to the First Continental Congress. The instrument marked him as a revolutionist, and as an advocate of independence from England, for in it he distinctly claimed that the colonies had a right to govern themselves without interference from the English Parliament. His views were too radical for the Virginia convention to give them its official stamp.

Jefferson was also elected a member of the



THOMAS JEFFERSON,
THIRD PRESIDENT OF THE UNITED STATES.

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convention of 1775, which met at St. John's Church, Richmond, and when Patrick Henry by his eloquence carried the colony into open rebellion against the mother country, Jefferson was appointed a member of the committee to devise a plan for organizing the militia of the colony. Shortly after this he became a member of the Second Continental Congress. When he entered that body, he was 32 years of age, being one of the youngest three members. Here he was placed on such important committees as those which drafted a paper to explain the rebellious attitude of Massachusetts at Lexington and Concord, and to reply to Lord North's "Clementary Policy." On each committee he showed such a strong republican tendency that his suggestions were not accepted. The members of the Continental Congress of 1775 were not far-sighted enough to see that independence was the only course. Finally, in the spring of 1776, there came to the Virginia members of Congress instructions from the Virginia convention of 1776 that the united colonies should be declared free and independent States; and accordingly Richard Henry Lee, called the American Cicero, moved that a Declaration of Independence should be adopted. In accordance with the motion, a committee was appointed and the members were elected by ballot. Jefferson's facility for writing was so well known to the Congress that he received the highest number of votes and was named as chairman of the committee over such men as John Adams, Benjamin Franklin, Roger Sherman and Robert R. Livingston. To him as chairman fell the task of drafting that immortal document which stands in the history of the world as the most revolutionary political paper ever written. On 4 July 1776, the instrument, practically as offered by Jefferson, was unanimously adopted and to it were placed the signatures of all the members of Congress then present, except one. The principles set forth in that document mean a government by and for the people, and show that Jefferson was far ahead of his day; for it is only at the dawn of the 20th century that we are beginning to comprehend the great and universal truths that Jefferson made known to the world (See DECLARATION OF INDEPENDENCE.) Jefferson retired from Congress in 1776, and, on returning to his native State, entered the Virginia legislature with the hope of revising and modifying her laws so that they might accord with republican government. For three years he served in the House of Delegates. During this time he succeeded in breaking down the laws of primogeniture and entail, in practically disestablishing the English Church, and in passing one of the best laws that the world has ever seen for public education providing an ideal system from the primary school to the university. Through his influence the legislature appointed a committee to revise thoroughly the laws of Virginia. The committee was composed of Edmund Pendleton, George Wythe and Jefferson. After two years, the revision, chiefly done by Jefferson, was submitted to the General Assembly, but it was not adopted *in toto*. Finally, however, in 1785, while Jefferson was in France, his faithful friend and political follower, James Madison, secured the passage of nearly all of Jefferson's work. It was at this time that the legislature approved the famous Statute for Re-

ligious Freedom, by which the complete separation of Church and State was accomplished, except the taking away of the *glebe* lands, a thing which was done in 1802. Jefferson wished even more radical changes in Virginia, such as the equalizing of representation on population instead of having two representatives from each county. He also desired that the suffrage should not be restricted to land owners, but that it should be extended to all men who might be subject to military duty. He likewise advocated more local self-government in the counties and towns of the State. He even went so far as to advocate the emancipation and the deportation of the slaves from Virginia. These measures were too radical for the Virginia Assembly, and were rejected. It is interesting to note, however, that all of them have since been accomplished save the deportation of the negroes.

Governor of Virginia.—Jefferson was governor of Virginia from June 1779 to June 1781. These were trying times; Virginia was invaded by British troops under Cornwallis, and Jefferson lacked money and resources with which to defend properly the State. His administration has often been criticised, some claiming that he was a mere doctrinaire and not a practical man; but close scrutiny shows that he did all that then lay in his power.

In Congress and at the French Court.—In 1783 Jefferson entered the Congress of the United States. To this body he proposed in 1784 a plan for the government of the Northwest Territory which Virginia so generously gave to the Union. One clause of this plan provided for the prohibition of slavery in that territory after 1800, and for this reason the plan was not adopted. In 1787, however, Congress enacted a bill for the government of the Northwest much like the original draft of Jefferson. From him Congress had the plan of our present decimal monetary system. In 1784 Jefferson was sent to France to join Benjamin Franklin and John Adams in negotiating commercial matters with foreign countries, and in 1785 he succeeded Franklin as our minister plenipotentiary to the French court. Through his efforts many unjust impositions on American commerce were removed by the French government.

Secretary of State.—In October 1789 he returned to America, and the following year became secretary of state in Washington's cabinet, in which position he opposed Hamilton (q.v.), who favored the exercise of extensive powers by Congress. Jefferson believed in a real federal relation between the States, and in a restricting of the congressional powers to purely constitutional authorizations. The final line of cleavage came when Congress passed a bill to establish a national bank. Hamilton submitted to Washington a paper asserting that such a step was legal, while Jefferson made a vigorous written protest showing that the bill was unconstitutional. Washington approved the measure, thus accepting Hamilton's views as correct. The Bank Bill, along with similar congressional acts, caused the establishment of two distinct parties—the Federalist or Loose Construction Party, headed by Hamilton, and the Anti-Federalist or Strict Construction Party, with Jefferson as its leader. Jefferson's followers were usually called the Democratic-

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Republicans. (See BANKS AND BANKING, AMERICAN.)

In December 1793 Jefferson resigned from the cabinet and returned to Monticello, where he remained for four years, studying farming. His estate at this time contained 10,647 acres of land, worked by 154 slaves, and stocked with 34 horses, 5 mules, and 249 cattle. Among the negroes he had a sort of industrial (manual-training) school, and taught them to be cabinet-makers, bricklayers, masons and smiths.

Vice President.—From his retirement at Monticello, Jefferson was called to become Vice President in 1797, a position which he held till 1801. During these four years, he bitterly opposed the so-called monarchical tendencies of the Federal party as seen in the Alien and Sedition Acts (q.v.), and he boldly asserted the compact theory of State sovereignty in the Kentucky Resolutions of 1799. The Kentucky Resolutions and Virginia Resolutions of 1798-9 (the latter framed by Madison after a copy of the Kentucky Resolutions sent him by Jefferson), made the platform, so to speak, of the Democratic-Republican party which elected Jefferson as President in 1801.

President.—From 4 March 1801 to 4 March 1809 Jefferson was President. He was the first President to be inaugurated in Washington City. He believed in rotation in office, and in pursuance of this idea, removed a number of Federalists from their positions. His great act, however, was the purchase of the Louisiana Territory from France for the sum of \$15,000,000. This vast territory was acquired for two reasons: (1) In order that the United States might have control of the Mississippi River, and the port of New Orleans; and (2) that the United States might not be hampered by European countries in the development of a republican form of government. As secretary of state in Washington's cabinet, Jefferson had practically asserted what was afterward known as the Monroe Doctrine, when he claimed that the United States should see that no European countries, other than those already holding possessions, secure a foothold in America. In 1801 Jefferson viewed with alarm the transfer of the Louisiana Territory from Spain to France, for he feared that, with France added to Spain, England and Russia, in control of colonies in America, republican government would have a hard struggle. Jefferson was accused of inconsistency for having sanctioned the Louisiana Purchase (q.v.), for if he had applied the strict construction principle of the Constitution here as in such acts of Congress as the establishment of the national bank, this Territory could not have been purchased, there being no provision in the Constitution allowing territorial expansion. But Jefferson's political sagacity kept him from refusing this great opportunity, and his wish of expansion caused him to advocate earnestly the purchase of Florida from Spain. It was 13 years later before his desire was accomplished. The second administration of Jefferson was not so successful as the first. It opened with a war against the Tripolitan pirates who were plundering American commerce. The outcome of this war was to increase our influence among the nations of the world. The last years of the second term were marked with difficult complications arising out of the Napoleonic wars. Napoleon tried

to prevent the United States from trading with England, and England retaliated by attempting to cut off all commercial relations between the United States and France. Many American vessels were seized by both England and France. Adding to this indignity, England claimed the right to search American vessels for English seamen, and an English war vessel actually fired on an American man-of-war, killing three of the crew and wounding 18. Jefferson tried to meet the restrictions on American commerce by the Non-Importation Bill and the Embargo Act. To enforce the measures all of the New England ships would have been shut up in American harbors. The New England merchants preferred to run the risk of losing their ships to keeping them without traffic; therefore they began to abuse the President and his policy. The result was that Congress felt forced to repeal the Embargo Act. Jefferson always claimed that had the embargo been enforced the United States would have gained its rights without the second war with England in 1812. (See EMBARGO IN THE UNITED STATES.)

Private Citizen.—On 4 March 1809, Jefferson retired from the White House, and spent the remaining 17 years of his life at Monticello. In these latter days he was known as the "Sage of Monticello," and to his home came people of prominence from all parts of the world to consult with him on great questions of politics and economics. Often his housekeeper had to provide beds for 50 guests. The demands which were made on his hospitality were so great that he died a bankrupt. During this period of his life he did all that he could to encourage better methods in agriculture, to reform the government of Virginia, and to develop in it a better system of education. The crowning event of his life was the establishment of the University of Virginia (q.v.) in 1819. He died on 4 July 1826, just 50 years from the day that has made him famous in all history, and by a singular coincidence his old rival and political antagonist, John Adams, passed away on the same day. Jefferson asked that three things be inscribed on his tomb: "Author of the Declaration of Independence; of the Statute for Religious Liberty in Virginia, and Founder of the University of Virginia,"—three acts which have made him famous.

Jefferson's Principles.—Jefferson stands in history for: (1) Republican government and the sovereignty of the people; (2) Opposition to privileged orders of nobility and the entail system; (3) Universal education and local circulating libraries; (4) Separation of Church and State; (5) Freedom of thought and speech; (6) Local self-government; (7) Economy in government and small public debt; (8) A policy of peace; (9) Political equality and universal suffrage; (10) Strict construction of the Constitution and the sovereignty of the States; (11) Well-trained militia and small standing army; (12) Metallic money, either gold or silver, as a standard, and no paper legal tender; (13) Opposition to bounties and monopolies; (14) Emancipation and deportation of slaves; (15) Expansion of the United States to include Louisiana, Florida, Cuba, and Canada; (16) Maintenance of Indian reservations; (17) Judiciary beyond the control of the legislative or executive branches of government; (18) Small navy; (19) Opposition to nepotism; (20) Rotation in

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office; (21) Opposition to all secession movements, North or South. This review will show that Jefferson probably gave to the world more broad principles of government than any other man. Wherever republican forms of government exist there the name of Jefferson will always be uttered with reverence and respect.

Bibliography.—Ford's 'Writings of Jefferson' (1802-9); Randall's 'Life of Jefferson' (1888); Morse's 'Life of Jefferson' (1883); Forman's 'Life and Writings of Jefferson' (1900).

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Jefferson-Burr Imbroglio, im-brō'lēō, a disputed Presidential election which resulted from a defective clause in the Constitution and caused its amendment in 1800. By its original provisions, the person who received the highest number of electoral votes should be President, the next highest Vice-President. Each set of electors had informally agreed that to save the pride of the leading candidates (Jefferson and Burr, Adams and Pinckney) each pair should have equal votes, and with one exception never reflected that this meant a tie; one Rhode Island Federalist elector cast his second vote for John Jay instead of Pinckney, and there is an unproven charge that Burr intrigued for an extra vote over Jefferson. They, however, received 73 each, and the Federalist House had to choose between the two Democratic candidates. Rules were adopted for the balloting, among the chief being that the Senate should be admitted, that the balloting should be in secret session, and that the House should not adjourn till a choice was made. The Federalists in caucus decided to vote for Burr; perhaps partly to spite the Democrats—Jefferson being their great national leader and the great Federalist terror, and the man the Democrats had intended to vote for as President—and partly because Burr as a New York man would consult Northern commercial interests, which the Virginian Jefferson might antagonize. They were right in this; Burr would not have laid the Embargo. Their solid vote would have elected Burr by one (nine out of 16 States); but they could not hold their members, three of whom bolted and voted for Jefferson to satisfy public feeling in their districts. Thus Jefferson had eight States, Burr six, and Vermont and Maryland were divided. But the Burr electors in the last two secretly agreed with Bayard of Delaware, who had also voted for Burr, that if there were likely to be bad blood and danger from prolonged balloting, they would stop it by voting for Jefferson. The casting vote thus lay with Bayard, who justly commanded confidence; but as the agreement was not known, the situation seemed much more perilous than it was. The balloting lasted a week without change. Some of the Federalists plotted to have it last till John Adams' term expired, and then let the others fight it out, or leave it by special act to Chief Justice John Marshall (Federalist), as a sort of regent trustee. The Democrats countered by resolving either to have Jefferson and Burr jointly (one of them certainly being President) call a special session, or to seize the capital by a militia force, call a convention, and revise the Con-

stitution. Finally, after 34 ballots, the confederate electors decided that if Jefferson would give a guarantee for the civil service, he should have the election after one more ballot; he gave the guarantee, and was elected on the 36th ballot by 10 to 6 (States). Burr became Vice-President; that the attempt to put him at the head was mainly due to real fear for commerce is made probable by the fact that every New England State except the one (Vermont) which had no commerce, voted for him to the last. This affair resulted in the passage of the Twelfth Amendment (see CONSTITUTION OF THE UNITED STATES), which obliged the electors to specify their choice for the offices on distinct ballots, and enlarged the range of choice to three candidates in case of tie.

Jefferson, Texas, city, county-seat of Marion County; on the Cypress Bayou, and on the Missouri, K. & T. and the Texas & P. R.R.'s; about 20 miles from the eastern boundary of the State and 142 miles east of Dallas. It was settled in 1850 and incorporated in 1866. It is situated in an agricultural and stock-raising region with rich iron ore deposits in the vicinity. Some of the principal industrial establishments are furnaces, machine-shops, foundries, saw-mills, cottonseed-oil mills, and large storage houses. The shipments are chiefly articles manufactured in the city, vegetables, grain, cotton, live stock, and fruit. The principal buildings are a government building, the city and county buildings. An iron bridge across the Bayou and good roads assist in making Jefferson the trade centre for a large part of Marion and Cass counties. Pop. (1900) 2,850.

Jefferson, Wis., city and county-seat of Jefferson County, at the junction of the Rock and Crawfish rivers, 50 miles west of Milwaukee; and on the Chicago & Northwestern railroad. It was settled in 1837 and is governed by a mayor and a council elected every two years under a charter of 1893. It has pork-packing plants, flour-mills, tanneries, brick and tile works, carriage and wagon factories and other industries. The city owns and operates the waterworks and the electric-lighting plant. Pop. (1900) 2,584.

Jefferson City, Mo., city, capital of the State, and county-seat of Cole County; on the Missouri River, and the Chicago & A., and the Missouri P. R.R.'s; 125 miles west of Saint Louis. It is the farming and manufacturing trade centre for Cole and adjacent counties; has manufactories of flour, shoes, clothing, beer, brooms, bricks, farming implements, carriages and wagons, and iron foundries. It is the seat of Jefferson City College, the general western offices of the Standard Life Insurance Company, Lincoln Institute, State Capitol building, State penitentiary, State armory, governor's mansion, Supreme Court building, United States courthouse, and the Carnegie Public Library. It has gas and electric light plants, 2 national banks, daily, weekly, and monthly periodicals, and an assessed property valuation exceeding \$800,000. Jefferson City was settled in 1826 and was first incorporated in 1839. A mayor and council elected every two years administer the affairs of the city. Pop. (1890) 6,742; (1900) 9,664.

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Jefferson River, Montana, a stream about 200 miles long, formed by the union of the Beaver Head and Wisdom (or Big Hole) rivers in Madison County. It unites with the Madison and Gallatin to form the Missouri.

Jeffersonton, Engagement at. Early in October 1863 the Army of the Potomac, under command of Gen. Meade, lay around Culpeper Court House, with the advance of two corps on the Rapidan. Gen. Lee, who was south of the Rapidan, determined to flank Meade's position, seize the Orange and Alexandria Railroad north of the Rappahannock, and intercept his retreat upon Washington. Informed of the movement, Meade withdrew his army to the north side of the Rappahannock, 11 October, his rear-guard of cavalry having a sharp engagement with the Confederate cavalry at Brandy Station. Believing that the Confederate army was moving upon Culpeper, Meade turned about and on the 12th, threw three infantry corps and a cavalry division south of the Rappahannock, with instructions to push forward and find and strike Lee, if at Culpeper. When they reached Brandy Station the Confederate army was nowhere in that neighborhood. At this time Gen. Gregg's division of Union cavalry was guarding the upper fords of the Rappahannock and Hazel rivers; on the morning of the 12th Col. Gregg's brigade crossed the Rappahannock near Sulphur Springs; his pickets at Jeffersonton being driven in, he marched for that place, found it in possession of the enemy, drove them from the town, and occupied it. That morning Fitzhugh Lee's cavalry division, leading the Confederate advance from near Madison Court House, crossed Hazel River at Starks' Ford and pressed on toward the Rappahannock. The 11th Virginia cavalry drove Gregg's skirmishers into Jeffersonton and attacked the two regiments in the town, but was driven out after losing several men. The 7th and 12th Virginia were now sent to the left and right, encircling the town, a combined attack was made, and Gregg was utterly routed and driven across the Rappahannock, with a loss of about 400 men, most of them captured. The Confederate loss was about 40 killed and wounded. When Meade heard of the engagement, and that Lee was crossing the Rappahannock at Warrenton Springs, he hastily recrossed the river, withdrew to Auburn and Catlett's Station and, on the 14th, to Centreville, Lee following closely and attacking his rear at Auburn and Bristoe Station during the day. Consult: 'Official Records,' Vol. XXIX.; Walker, 'History of the Second Army Corps.'

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Jeffersonville, Ind., city and county-seat of Clark County; on the Ohio River, and the Baltimore & O. S. W., the Pittsburg, C. C. & St. L. and several other railroads; 50 miles southwest of Evansville. It is opposite Louisville, Ky., with which it is connected by railroad bridges. It contains the Southern State penitentiary, high school, public library, prison library, United States quartermaster's supply depot, and has waterworks, gas and electric lights, street railways, large car works, 2 national banks, daily, weekly, and monthly periodicals, and an assessed property valuation of about \$1,700,000. Being at the head of the Ohio falls excellent water power is obtained here and the city has

numerous industries, among them extensive works for freight and passenger cars and for building river steamboats. The mayor and council are elected biennially; the police commissioners are appointed by the governor of the State. Pop. (1890) 10,666; (1900) 10,774.

Jeffrey, jēf'rī, **Francis**, Lord, Scottish judge and critic: b. Edinburgh 23 Oct. 1773; d. Craigbrook Castle, near Edinburgh, 26 Jan. 1850. He was educated at the University of Glasgow, and Queen's College, Oxford, and was admitted to the Scottish bar in 1794. He assisted in establishing the 'Edinburgh Review' in 1802 with Sydney Smith, Lord Brougham, and others, and after two numbers had been issued became its editor, a position which he held till June 1829. In 1831 he was made lord-advocate, and sat for several years as member of Parliament for Edinburgh. He was made a lord of session in 1834, and continued during a period of 16 years to be one of the ablest and most popular judges of the supreme court in Scotland. Consult: Cockburn, 'The Life of Lord Jeffrey' (1852); Gates, 'Three Studies in Literature' (1899).

Jeffreys, jēf'rīz, **George**, Lord, English judge: b. Acton, near Wrexham, Wales, 1648; d. London 19 April 1689. He was called to the bar in 1668, and soon after was chosen recorder of London. He was appointed, successively, a Welsh judge and chief justice of Chester, created a baronet in 1680, and became chief justice of King's Bench in 1683. He was one of the advisers and promoters of the arbitrary measures of James II.; and for his sanguinary and inhuman proceedings against the adherents of Monmouth on the famous 'Bloody Assize,' was rewarded with the post of lord high chancellor (1685). After the abdication of King James the chancellor, who had disguised himself as a seaman, was detected by a mob and carried before the lord mayor, who sent him to the lords in council, by whom he was committed to the Tower, where he died. Consult: Woolrych, 'Memoirs of the Life of Judge Jeffreys' (1827); Campbell, 'Lives of the Lord Chancellors,' Vol. IV. (1849-57); Macaulay, 'History of England,' Vols. I. and II. (1856); Irving, 'Life of Judge Jeffreys' (1808).

Jeffries, jēf'rīz, **John**, American physician: b. Boston, Mass., 5 Feb. 1744; d. there 16 Sept. 1819. He was graduated at Harvard in 1763, studied medicine at London and Aberdeen, and returning to Boston in 1769 he entered upon a lucrative practice, which continued until the evacuation of the town by the British troops, whom he accompanied to Halifax. After serving as surgeon-general of the troops in Halifax, he was appointed in 1779 surgeon-major of the forces in America. In the succeeding year he established himself in London in the practice of his profession, but also occupied himself much with scientific studies, and in the prosecution of his experiments in atmospheric temperature undertook 7 Jan. 1785, a remarkable voyage in a balloon from Dover cliffs across the British channel, landing in the forest of Guenness in France. This was the first successful attempt at aerostation on an extended scale, and Jeffries in consequence received many attentions from the learned societies of Paris. In 1789 he returned

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to Boston, where he practised his profession until the close of his life. He announced a course of lectures on anatomy in Boston in 1789, but so great was the prejudice against the practice of dissecting, that on the evening of the second lecture a mob broke into his anatomical room. The course thus interrupted was never resumed, and the single lecture delivered by Jeffries is said to have been the first public one on anatomy given in New England.

Jehovah, je-hō'vā, the most sacred name applied to God among the Jews, though the Hebrew word in the English Bible is generally translated by *LORD* (in small capitals). The case is similar with the Greek version (the Septuagint), which renders this word by *Kyrios*, and with the Latin Vulgate, which translates it by *Dominus*, both these words signifying Lord. The proper form of the name is now generally believed to be *Yahvch* or *Yahweh*. Why there should be any doubt about the matter is explained by the fact that in Hebrew only the consonants were written, giving the form *Yvh*, and the name itself was never uttered, the Jews in reading substituting another divine name, usually *Adonai*. The exact meaning of the word is doubtful, but as a form of the Hebrew verb "to be" some explain it as, He who is, was, and will be, or the Eternal and Unchangeable, and it seems certainly to imply existence. The awe which the Hebrews cherished for this name led them to avoid pronouncing it, as they still do. The monotheistic conception of the Jehovah of the Israelites differs from all other theological conceptions of that age. No image of him was allowed. He was the invisible protector and king of Israel, worshipped by obedience to his commandments, and an observance of the ceremonies established by the law. As is well known, in some parts of the Pentateuch *Elohim* is used almost exclusively, in others *Jehovah*, and this has led many to imply a corresponding difference of authorship. Others deny that this is at all a necessary deduction, maintaining that either name might be used by the same writer according to the conception of the Most High that was in his mind at the moment, *Elohim* being the abstract expression for absolute Deity, apart from the special notions of eternity, unity, holiness, etc.

Jehovist, je-hō'vist, sometimes called **JAHWIST**, a hypothetic author of the Pentateuch, who used the word Jehovah, or Jahweh, as the name of God instead of Elohim, which term denotes the Supreme Being in other passages of the sacred canon. To the writer who employs the latter designation is applied the term Elohist. According to the theories of many modern Biblical critics the present Pentateuch is a compilation from two original records, one made by an Elohist, the other by a Jehovah. The Jehovah history is supposed to be the older of the two (by some critics it is dated 950 B.C.), and to have consisted of an account of Jehovah's dealings with the chosen people up to the conquest of Palestine west of the Jordan. It is a religious history of the attainment of the Promised Land. In this history was emphasized the supremacy of Jehovah as the one God, creator of the world, and the national God and Father of the chosen people, in whose affairs He interposes as He appeared to their early fore-

fathers in the shape of a man or an angel. In the Elohist record, which is supposed to cover the same period and to have been written 700 B.C., there is a more modern interpretation of history attempted. The anthropomorphic suggestions of deity are softened, Elohim interposes merely by a voice, speaking to his people in words of encouragement or rebuke. Through the narrative of the hypothetical Elohist there runs also a tone of sadness, there are anticipations of coming disaster and disappointment.

The Jehovahistic or Jahwistic editor who combined these two histories is supposed to have lived in the 7th century B.C., while in the 4th century B.C. a third post-exilic writer added to these combined elements the legal codes which swelled the Pentateuch into the Hexateuch.

Jehu, jē'hū, general of the army of Joram, king of Israel. The prophet Elisha sent one of the school of the prophets to anoint him king over Israel, and in a sudden revolution Joram was slain and Jehu reigned in his stead. He was the first of a new, the fifth, dynasty, and reigned 843-815 B.C. On his accession he massacred all the family of Ahab, including his wretched wife Jezebel, and put the priests of Baal to the sword. In order to obtain possession of the kingdom of Judah he slew Ahaziah the king, and 42 of his family. But his reign was not a prosperous or successful one, and by an invasion of the Assyrians he lost all the territory east of the Jordan. His name has been found on the black obelisk discovered by Layard at Nineveh, and now in the British Museum. This obelisk was set up by Shalmaneser II., and the inscription refers to the tribute paid by Jehu to the Assyrian monarch.

Jejeebhoy, Sir Jamsetjee, Parsee merchant and philanthropist: b. Bombay 15 July 1783; d. there 15 April 1859. By his energy and business talents he succeeded in achieving for himself the position of the first native merchant in India, and realizing a fortune of nearly a million sterling. The munificence displayed by him toward all benevolent and public objects, without regard to class or creed, was of the most princely kind, his donations from first to last being estimated at about \$1,500,000. Among benevolent institutions founded by him are the great hospital at Bombay which bears his name, the establishment in the same city for the education of poor Parsee children, and the *dhurumsallas*, or places of refuge for travelers in various parts of the country. He also constructed the causeway uniting the islands of Bombay and Salsette, the waterworks at Poonah, the bridges at Earla, Parta, and Bartha, and other public works. He was knighted in 1842, and in 1857 made a baronet. A statue was subsequently erected in honor of him in the town-hall of Bombay.

Jejunum, je-joo'nūm (Latin, *jejunus*, empty), the second portion of the small intestine, succeeding the duodenum, and so named from its generally being found empty after death. The duodenum extends to about 12 inches in length, and the jejunum forms two fifths of the remaining portion of the small intestine. See **INTESTINE**.

Jekyll, jē'kil, Gertrude, English horticulturist: b. London 29 Nov. 1843. She holds the

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gold medal of the Royal Horticultural Society and has published: 'Wood and Garden' (1899); 'Home and Garden' (1900); 'Wall and Water Gardens' (1901); 'Lilies for English Gardens' (1901); 'Roses for English Gardens' (1902).

Jelly includes every translucent juice so far thickened as to coagulate when cold into a trembling mass; as the juices of acid or mucilaginous fruit, currants, etc., which, by the addition of one part of sugar to two parts of juice, and, by boiling, have obtained a proper consistency. Jelly may be of either animal or vegetable origin.

1. *Animal Jelly*.—The soft parts, such as the muscles, skin, cartilage or integuments of animals, when boiled in water, yield a solution which on cooling solidifies to a tremulous jelly. The substance may also be prepared from bones by subjecting them, after crushing, to the united action of high pressure steam and water. Seventy pounds of bones, when treated with 1 pound of water in the form of steam, at a pressure of 4 pounds to the square inch, and simultaneously digested in 5 gallons of water, will yield about 20 gallons of a strong jelly. Animal jelly is a colorless, elastic, transparent substance, without taste or smell, which is almost insoluble in cold but very soluble in hot water. After boiling for some time in water a solution of animal jelly loses the power of gelatinizing upon cooling; alcohol, however, still throws down a precipitate having the composition of the original substance. When moist animal jelly is exposed to the air it putrefies, at first becoming acid, but afterward evolving ammonia.

Animal jelly seems to be nearly identical in composition with the tissues which yield it, so that we are unable to trace any chemical change, except, perhaps, the assimilation of water during the process of its manufacture. There is probably a rearrangement of the atoms accompanying this assimilation of water, but the subject has not yet been sufficiently studied. The following analysis shows the average percentage of carbon, hydrogen, and nitrogen in animal jelly:

	Carbon	Hydrogen	Nitrogen
(1)	49.0	7.0	18.0
(2)	50.0	6.5	17.5

Various observers have also detected sulphur among its constituents.

2. *Vegetable Jelly*.—When the juice of fruits is heated with sugar, the liquid forms a stiff jelly on cooling. It appears from the researches of Frémy and others that unripe fruits contain a compound of carbon, hydrogen, and oxygen, called *pectose*; as the fruit ripens, this substance is transformed into *pectin*, the change being brought about chiefly by the influence of a peculiar ferment called *pectase*, which is contained in the fruits. As pectin is soluble in water, the expressed juice of ripe fruits contains a large quantity of this substance, which on heating to a temperature of about 105° F. is converted into one or more substances which have not as yet been completely studied, but which have the property of gelatinizing on cooling. The principal of these substances are *pectic* and *metaplectic* acids. This latter acid, when boiled along with another strong acid, whether mineral or organic, is decomposed, one of the products being pectin sugar, a substance which is

closely allied to glucose, so that in all probability there is produced in the very process of manufacturing jellies more or less of this sugar, which certainly is not cane-sugar, and which might, therefore, be by some regarded as an adulteration. The processes which, in the living plant, result in the transformation of pectose into pectin may be imitated on a small scale by heating the juice of unripe fruit with the pulp, which contains the ferment pectase, or with a dilute acid which induces the same change as this substance. Alkalies also produce a similar effect. The exact composition of these various pectous substances yet remains a matter of doubt.

Jellyfish, the medusa-stage of *Hydrozoa* (q.v.), but more especially the common name of *Scyphozoa* (formerly *Discomedusa*), the second class of the phylum *Calenterata* (q.v.). A familiar example is the common large jellyfish of the coast of New England, *Aurelia flavidula*. It sometimes reaches the diameter of 10 inches; its umbrella-shaped body is convex and smooth above, and from the under sides hang down four thick oral lobes which unite to form a square mouth-opening also giving off four tentacles. The margin of the umbrella or disk is fringed and bears eight eyes which are covered by a lobe. Just under the surface are seen the water-vascular canals, branching out from four primary canals radiating from the stomach. When in motion, the disk contracts and expands rhythmically, on the average from 12 to 15 times a minute.

The *Aurelia* spawns late in the summer, the females having yellowish ovaries, while the sperm glands of the males are roseate in hue. The eggs are fertilized in the sea, and the ciliated pear-shaped larva by October sinks to the bottom, attaching itself to rocks or shells, finally assuming a hydra-like shape, with often as many as 24 long slender tentacles. This is the *Scyphistoma* stage in which it remains about 18 months. From this it passes into the *Strobila* stage in which the body divides into a series of cup-shaped disks, each of which is scalloped on the upturned edge. These disks separate one after the other in March, and swim away as miniature jellyfishes called *Ephyra*. The *Ephyra* is at first about a fifth of an inch in diameter, and becomes a fully formed *Aurelia* in April, reaching maturity in August. Another but less common jellyfish on the coast of New England and in the North Atlantic is the great *Cyanea arctica*, or "blue jelly," which is nearly two feet in diameter, sometimes from three to five, and with very long string-like tentacles, sometimes extending from 20 to 100 feet, which are filled with stinging or lasso-cells (*trichocysts*), so that the animal is poisonous to fishermen and bathers. While these forms undergo a metamorphosis, in fact, an alternation of generation; other kinds, as *Pelagia*, etc., are known to develop directly from the egg, and even the *aurelia* under exceptional circumstances does not pass through the scyphistoma stage. The jellyfishes are divided into a number of groups. They are most numerous in the tropical seas, comprising forms of great beauty. Consult: Romanes, 'Jellyfish, Starfish and Sea Urchins' (1885); Packard, 'Zoology' (1897); Arnold, 'The Sea Beach at Ebb-tide' (1902).

JELLYFISHES.



FORMS OF DISCOMEDUSÆ.

- 1. *Pilema giltschii* ($\frac{1}{4}$ natural size).
- 2. View of the same from above (the organs seen through the transparent convex disk or "umbrella").
- 3. View of the same from beneath.
- 4. *Rhopilema frida* ($\frac{1}{2}$ natural size).
- 5. *Brachiophorus collaris* ($\frac{1}{2}$ natural size).
- 6. *Cannorrhiza connexa*.
- 7. The same, from beneath, ($\frac{1}{2}$ natural size).

JENA—JENKINS FERRY

Jena, yā'nā, Germany, town 12 miles east of Weimar, on the left bank of the Saale. It consists of the town proper and of four suburbs, and is a dull antiquated place. It contains a famous university which was opened in 1558, and attained its highest prosperity toward the end of the 18th century, when it numbered Schiller, Humboldt, Fichte, Schelling, and Griesbach among its teachers, and was attended by above 1,000 students. In 1844 the number had dwindled down to 411; but in 1902 it had about 800. It has 98 professors and instructors, who teach the different branches of law, medicine, philosophy, and theology; and possesses an anatomical theatre, botanical garden, observatory, good physical and chemical cabinets, and a library of 200,000 volumes. Pop. 15,499.

Jenckes, jēnks, Joseph, American inventor: b. Hammersmith, London, England; d. Lynn, Mass., 16 March 1683. About 1645 he came to the Massachusetts Bay colony, and in that year settled at Lynn, where he established the first iron-foundry in the colonies. He was also an inventor, and in 1646 obtained on an improved water-wheel the first recorded patent in America. He secured a patent also for an improved grass-scythe, and originated other improvements and inventions in machinery and tools. In 1654, under contract with the Boston selectmen, he built the first fire-engine in this country. In 1652 at the Lynn iron-works he cut the dies for the Massachusetts coinage, the first executed in America. Among these coins were the so-called "pine-tree" shillings, deriving their name from that emblem on the obverse side.

Jenkin, jēng'kin, Henrietta Camilla Jackson, English novelist: b. Jamaica about 1807; d. Edinburgh 8 Feb. 1885. In 1832 she was married to Charles Jenkin, an English naval officer. Her novels were lively studies of character and popular in their day, among the best being: 'Cousin Stella' (1859), a portrayal of West-Indian life and manners; 'Who Breaks, Pays' (1861), in which the flirt is admirably pictured; 'Skirmishing' (1862); 'Two French Marriages,' issued in New York as 'A Psyche of To-day' (1868); 'Within an Ace' (1869).

Jenkins, jēng'kinz, Charles Jones, American jurist and statesman: b. Beaufort County, S. C., 6 Jan. 1805; d. Summerville, Ga., 14 June 1883. He was graduated from Union College, Schenectady, N. Y., in 1824, and after the study of law began practice in Augusta, Ga. He was a member of the Georgia legislature in 1830 and after a short service as attorney-general of the State was a member of the legislature 1836–50, and a leader of his party there. He was State senator 1856–60, and was a judge of the Georgia supreme court 1860–5. He became provisional governor of his State in 1865, holding office till 1868, and presided over the Constitutional Convention of 1877. Consult: Jones, 'Life of C. C. Jenkins' (1884).

Jenkins, John Edward, English political and social writer: b. Bangalore, India, 28 July 1838. He was educated at McGill University, Canada, and the University of Pennsylvania, and sat in Parliament for Dundee 1874–80. He became famous by the publication of his 'Ginx's Baby, his Birth and Misfortunes' (1870), a clever satire aimed at the clumsy

handling of the problem of English pauperism. Among later works of his which have circulated widely are: 'Lord Bantam' (1871); 'Little Hodge' (1872); 'Jobson's Enemies' (1879–82); 'A Paladin of Finance' (1882).

Jenkins, John Stilwell, American biographer: b. Albany, N. Y., 15 Feb. 1818; d. Weedsport, N. Y., 20 Sept. 1852. He was a lawyer by profession, and at one period edited the Cayuga 'Times.' Among his works are: 'Generals of the Last War with Great Britain' (1841); an abridgment of Hammond's 'Political History of New York' (1846); 'Alice Howard' (1846); 'Life of Silas Wright' (1847); 'History of the Mexican War' (1848); 'Heroines of History' (1853).

Jenkins, Thornton Alexander, American naval commander: b. Orange County, Va., 11 Dec. 1811; d. 9 Aug. 1893. Entering the United States navy as a midshipman in 1828, he served therein during the war with Mexico. Appointed to investigate European lighthouse systems he framed the law passed in 1852 under which the existing lighthouse board is managed. He saw active service during the Civil War and was chief of the bureau of navigation 1865–9. From 1869 to 1871 he was naval secretary of the lighthouse board and commanded the East India squadron 1871–3. In 1870 he was appointed rear admiral and retired from active service in 1873.

Jenkins Ferry, Battle of. During the winter of 1863–4 the Union forces of Generals Steele and Blunt held the line of the Arkansas River, with headquarters at Little Rock; the Confederates, under Gen. Sterling Price, held that of the Washita, with headquarters at Camden, which was strongly fortified. On 23 March 1864 Steele started from Little Rock southward with about 8,000 men to co-operate with Gen. Banks' expedition up Red River, the objective point of both being Shreveport, La. Gen. Thayer, with 5,000 men, left Fort Smith on the 21st to join Steele at Arkadelphia, and Col. Powell Clayton, with a small cavalry force, marched from Pine Bluff in the direction of Camden, which was Steele's first objective. Steele reached Arkadelphia on the 28th, was joined near Elkins' Ferry, on the Little Missouri, by Thayer, and, after several severe skirmishes, in which the Confederates were defeated, flanked Price out of Camden, 15 April, and occupied it. Here he was fully informed that Banks had been defeated on Red River and was retreating, and his own position became very precarious. Gen. E. Kirby Smith, who had been opposing Banks, marched rapidly with three divisions of infantry — 8,000 men and 14 guns — to join Price and crush Steele. Steele was too strongly entrenched at Camden to be attacked, but he was greatly harassed and nearly surrounded by the gathering Confederates, his forage-trains, with their guard, were cut off and captured, and, the loss of a large supply-train at Marks' Mills, 25 April, with nearly an entire brigade and a battery, determined him to fall back to the Arkansas River. He left Camden on the night of the 26th, crossed the Washita, and had hardly begun his movement northward when Smith and Price pressed him vigorously and kept up a running fight, which was particularly sharp on the 29th, when Steele reached Jenkins' Ferry, on the Saline River. The river was swollen,

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and Steele had crossed only part of his army when his rear brigade, commanded by Gen. S. A. Rice, was fiercely attacked by Price, and yielded some ground. But the brigade rallied, and, supported by a part of Engelmann's that had not yet crossed the river, engaged in a sanguinary fight lasting the greater part of the day. Three times the Confederates charged and were repulsed, and the Union line advancing, the Confederates fell back and did not renew the fight. Steele now crossed the river without further molestation, and moved leisurely to Little Rock, which was reached 2 May, and Thayer's division was sent back to Fort Smith. Price was so badly defeated that he made no effort to follow Steele north of Saline River. The Union loss at Jenkins Ferry was 63 killed, 413 wounded, and 45 missing. The Confederates report a loss of 86 killed, 356 wounded, and 1 missing. The Union loss during the entire campaign (23 March–2 May) was 102 killed, 601 wounded, and 1,072 missing, a total of 1,775. Consult 'Official Records,' Vol. XXXIV.; 'The Century Company's "Battles and Leaders of the Civil War,"' Vol. IV.

E. A. CARMAN.

Jenks, Edward, English publicist: b. Clapham, Surrey, 20 Feb. 1861. He was educated at Dulwich College and Cambridge University, and was dean of the faculty of law in the University of Melbourne 1889–92, and Queen Victoria professor of law in University College, Liverpool, 1892–6. He is now reader in English law at Oxford, and widely known as a writer on English law, his published works comprising: 'Constitutional Experiments of the Commonwealth' (1891); 'The Doctrine of Consideration in English Law' (1893); 'The Government of Victoria (Australia)' (1893); 'History of the Australasian Colonies' (2d ed. 1896); 'Outlines of English Local Government' (1895); 'Law and Politics in Middle Ages' (1897); 'A Short History of Politics' (2d ed. 1900); 'Edward I.' (1902); 'Parliamentary England 1660–1832' (1903).

Jenks, Jeremiah Whipple, American political economist: b. St. Clair, Mich., 2 Sept. 1856. He was graduated from the University of Michigan in 1878, and subsequently studied in Germany, at the University of Halle. He then studied law and was admitted to the Michigan bar. In 1886 he became professor of Greek, Latin, and German in Mount Morris College, Ill.; in 1886–9 was professor of political science and English literature at Knox College, Galesburg, Ill.; in 1889–91 professor of political economy and social science at Indiana University; and in 1891 became professor of political economy and politics at Cornell University. In 1899–1901 he was expert agent for the United States Industrial Commission on investigation of trusts and industrial combinations, and was also expert for the Department of Labor on the same subject. In 1902 he was commissioner of the United States War Department to the Philippines and other Oriental nations to investigate the condition of labor and other economic subjects. In 1903 he went to Mexico to consult with the minister of finance in regard to a change of the financial system. He has written: 'Henry C. Carey als Nationalökonom' (1885); 'The Trust Problem' (1900); 'Trusts and Industrial Combinations' (1900);

a part of the report of the Industrial Commission; and 'Report on Certain Economic Questions in the English and Dutch Colonies in the Orient' (1902); besides many magazine articles. He is recognized as one of the foremost authorities on the trust question, and his writings are marked by scholarly and accurate investigation, combined with unusual simplicity and clearness of statement.

Jenks, Tudor, American editor and author: b. Brooklyn, N. Y., 7 May 1857. He was graduated from Yale in 1878, from the Columbia Law School in 1880, studied art in Paris in 1880–1, practised law in New York in 1881–7, and in 1887 became a member of the staff of the 'St. Nicholas Magazine.' His writings include many magazine contributions in prose and verse, and 'The Century World's Fair Book' (1893); 'Imaginations, or Truthless Tales' (1894); 'The Boys' Book of Explorations' (1900), and 'Galopoff, the Talking Pony' (1901).

Jenner, jēn'ér, Edward, English physician, discoverer of vaccination as a preventive of the smallpox: b. Berkeley, Gloucestershire, 17 May 1749; d. there 26 Jan. 1823. Having adopted the medical profession, he visited London to attend the lectures of the celebrated anatomist John Hunter, in whose family he resided for two years. Returning to the country, he settled at Berkeley, to practise the various branches of his profession. His investigations concerning the cowpox were commenced about 1770, when his attention was excited by the circumstance of finding that some individuals to whom he attempted to communicate the smallpox by inoculation were not susceptible of the disease; and on inquiry he found that all such patients, though they had never had the smallpox, had undergone the casual cowpox, a disease common among the farmers and dairy-servants in Gloucestershire, who had some idea of its preventive effect. Other medical men were aware of the prevalence of this opinion, but treated it as a popular prejudice; and Jenner seems to have been the first who ascertained its correctness, and endeavored to derive from it some practical advantage. He discovered that the *variole vaccine*, or cowpox, as the complaint has been since termed, could be propagated from one human subject to another by inoculation, rendering all who passed through it secure from the smallpox. In 1798 he published a short treatise—'An Inquiry into the Cause and Effects of the Variolæ Vaccine'—and in July 1798, Cline, surgeon to St. Thomas's Hospital, introduced vaccination into that institution. The practice was adopted in the army and navy, and in the country generally, and soon spread to other countries, and honors and rewards were conferred on the author of the discovery. In 1802 a parliamentary grant was made to him of the sum of £10,000, and five years later a second grant of £20,000. Besides the treatise already mentioned, and 'Further Observations on the Variolæ Vaccine or Cow-Pox,' Jenner also published various letters and papers on the same subject, as well as on others. A famous paper of his on the cuckoo appeared in the 'Philosophical Transactions' in 1788. Consult: Baron, 'Life of Jenner'; Creighton, 'Jenner and Vaccination' (1889); Crookshanks, 'History and Pathology of Vaccination' (1890). The

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last-named work contains reprints of the 'Inquiry,' the 'Further Observations,' and other papers by Jenner. See VACCINATION.

Jenner, Katherine Lee Rawlings, English novelist: b. Hayle, Cornwall. She was married to Henry Jenner, and has published: 'A Western Wildflower' (1882); 'In London Town' (1884); 'Katharine Blythe' (1886); 'An Imperfect Gentleman' (1888); 'Love or Money' (1891); 'When Fortune Frowns' (1895); 'In the Alsatian Mountains.'

Jenner, Sir William, English physician: b. Chatham 1815; d. London 12 Dec. 1898. He was educated at University College, London, became in 1848 professor of pathological anatomy, and in 1857 of clinical medicine in that institution, and in 1861 physician to the queen. In 1862 he was appointed professor of the principles and practice of medicine in University College; in 1868 was created a baronet, and in 1872 a K.C.B., in recognition of his services during the severe illness of the Prince of Wales, now Edward VII. In 1881 he was elected president of the College of Physicians. He wrote various papers on specific diseases, and was the earliest to establish the difference in kind between typhus and typhoid fevers.

Jennings, jēn'īngz, Samuel, American colonial Quaker preacher: d. 1708. In 1680 he came from Buckinghamshire, England, to Burlington, N. J., and was governor of West Jersey in 1683. Becoming entangled in religious controversy he opposed the Quaker schismatic, George Keith, and in London in 1694, supported the action of the American Friends in regard to Keith. On returning to America he often made preaching tours through the various colonies, and after the recall of the English governor, Lord Cornbury, aided in restoring public order in the affairs of West Jersey.

Jennings, Sarah, DUCHESS OF MARLBOROUGH. See MARLBOROUGH, DUKE OF.

Jephson, jēf'sōn, Arthur Jermy Mountney, English writer of travels. He commanded a detachment under the explorer, Stanley, in the Emin Pasha relief expedition, was queen's messenger 1895-1901, and has been king's messenger from the latter date. He has published: 'Emin Pasha and the Rebellion at the Equator'; 'Stories Told in an African Forest'; 'The Story of a Billiard Ball' (1897).

Jephthah, jēf'tha, in Jewish history one of the judges of Israel (Judges xi., xii.). He was a son of Gilead, and was driven from home by his brothers, but when the Ammonites made war against Israel was summoned to defend his countrymen. Jephthah after trying conciliatory measures without success, put himself at the head of the Israelites, and defeated the enemy. He had made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house. He was met by his daughter, his only child, whom he accordingly sacrificed to the Lord (Judges xi. 29, 40). The way in which the vow was kept has given rise to much controversy, some authors maintaining that Jephthah put his daughter to death; others that he devoted her to perpetual virginity; others that he actually sacrificed her as a burnt-offering, and that, though prohibited by law of Moses,

human sacrifices occasionally took place among the Jews at this period.

Jep'son, Edgar, English novelist: b. London 28 Nov. 1864. He was educated at Oxford and has published: 'Sibyl Falcon' (1895); 'The Passion for Romance' (1896); 'The Keepers of the People' (1898); 'On the Edge of the Empire' (1900).

Jerboas, jēr'bō'az or jēr'bō'az, small rodents of the family *Dipodidae*, found in the sandy plains of Africa, Russia and southern Asia, and represented by a few species in North America. Their most prominent peculiarity is the great length of the hind legs, especially in the metatarsal portion, so that they look like miniature kangaroos. They walk ordinarily on their two hind feet, but when alarmed escape danger by long leaps. They are fawn-colored, as a rule, with long slender tails, large ears, big eyes, and nocturnal habits. They dwell in underground burrows and tunnels, many of which, more or less connected, are likely to be found together. Their food is mainly vegetable, but they also eat insects, eggs, etc.; they hibernate in cold climates, do not store food, and are the prey of foxes, jackals, wildcats, serpents, and Arab children. The most familiar species of jerboa is the Egyptian form (*Dipus aegypticus*), found in North Africa in arid places. The jumping-hare of South Africa (*Pedetes capensis*), and its ally, the jumping-mouse of North America (*Zapus hudsonius*), are also well-known examples of the family. The latter is a reddish "mouse," white underneath, which abounds all over the temperate parts of the country, and is easily recognized by its bounding gait. It is one of the longest and soundest of winter sleepers, preparing for its dormancy a warm ball-like nest of grass lodged in a bush or among strong weeds. Gerbils (q.v.) of Africa and India are often confused with jerboas, but are a group of true mice. Consult Lydekker, 'Royal Natural History,' Vol. III. (1895).

Jeremiah, jēr-e-mī'a, the second of the four major prophets of the Old Testament, the son of Hilkiah, of the priests that were in Anathoth, a town about three miles from Jerusalem. He flourished during the darkest period of the kingdom of Judah, under Josiah, Jehoiakim, Jecoeniah, and Zedekiah, having been called to the prophetic office in his youth, in the 13th year of the reign of Josiah 626 B.C. He continued in it till the 11th year of Zedekiah, when Jerusalem was taken by Nebuchadnezzar (588 B.C.). His task was to deliver messages and warnings to a corrupt people and to foretell the destruction of the nation. In Judah were two political parties—the one favoring an Egyptian alliance, the other a Chaldaean. Jeremiah repudiated both at first, but was driven over to the latter and unpopular party. He became the leader of this minority in contending with three features of popular infatuation—religious apostasy; neglect of justice; and false patriotism, which led the people frequently to break faith with Babylon, by bursting into revolt. He characterized Nebuchadnezzar as the servant of God, and prophesied the approaching burning of the temple. A cry for his life arose from the priests and prophets, and he escaped with difficulty. At last Jerusalem with its temple and palace was consumed with fire. Jeremiah was favorably

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treated by the Babylonian conqueror, and offered a home at Babylon, but preferred to stay among the people left in Judah. One section of this party thought they saw in Egypt a safe place of refuge from the power of Nebuchadnezzar, and led the people together with Jeremiah to Tahpanhes, where, according to Christian tradition, the prophet was stoned to death by his countrymen, who were incensed by his rebukes. According to the Rabbinical tradition, however, he and Baruch made their escape on the conquest of Egypt by Nebuchadnezzar.

Jeremiah, Lamentations of, the title given by the Septuagint translators, by the Vulgate and English Bible, to a book of songs and dirges which is placed next to the book of the prophecy of Jeremiah. The book is divided into five chapters each of which contains a complete composition. In I., II. and IV. the death of the Jewish nation is bewailed with the utmost abandonment of grief. The form of each elegy is poetry of the most strictly artificial kind. The metre is that of the Kinah (q.v.), the metre employed in dirges from immemorial time in the east. As if to run down the whole gamut of sorrow each verse begins with a different letter of the Hebrew alphabet, arranged, generally, in the usual order.

The whole work may be thus briefly analyzed. Elegy 1: Lamentation over the city after the people have been swept off into captivity. Help is asked from Jehovah. Elegy 2: The destruction of the city mourned over. Jehovah again called upon as alone able to save. Elegy 3: Sufferings of "Jehovah's servant," a personification of the whole pious multitude, described. Elegy 4: Contrast between former gladness and the present misery, which is attributed to national transgression. Elegy 5: A final appeal for help in prayer to Jehovah.

The date and authorship of the Lamentations are matters of dispute. Few modern critics attribute them to Jeremiah. They show traces, however, of that prophet's language and sentiment, but internal evidence is not conclusive. Some think that they are referred to in 2 Chronicles xxxv. 25. Consult: 'Commentaries' of Payne Smith; Cheyne; Plumptre; and Löhr, 'Die Klagelieder Jeremias' (1894).

Jeremiah, The Prophecy of, a book of the Old Testament containing the utterances of that prophet. The writings of Jeremiah, or certain of them, were taken down by his pupil and friend Baruch. They must therefore have been originally spoken without being previously written out, although it is possible that the scribe or secretary took them down at his master's dictation. The roll of Baruch contained all that Jeremiah had spoken for 23 years; probably, therefore, many of the prophecies may have been sketched merely as outlines. The substance of these impassioned appeals is imbued with firm belief in God's unfailing covenant with Israel and with David. Although Jeremiah is not so often quoted by New Testament writers as is Isaiah, yet there is abundant evidence in their writings that they read him, and he is not only a prophet of denunciation and warning but also of Messianic hope and promise. He shows, moreover, an intimate acquaintance with Deuteronomy, the utterances of his prophetic predecessors, and the book of Psalms.

The book seems naturally to be divided into five parts, the first of which contains six discourses, each of the last three introduced by the formula of sanction, "The word which came to Jeremiah from the Lord." Each of these discourses includes sketches, outlines or skeletons of different prophecies each by a distinct formula of sanction. Take for instance, the first discourse (1 ch. to 20 ch.), the first sketch would be in the first chapter, verses 4 to 10, introduced by the formula, "The word of the Lord came unto me saying." There are at least four of these brief sketches in the first chapter.

The second part of the book consists of 15 prophecies, which are fuller and completer than those of the first part, each with its formula of sanction. They include poems, appeals, allegorical object-lessons, historic narratives, and one letter. The third part is a connected narrative in classic Hebrew, different in style from that of the first 20 chapters. The fourth part contains poetic invectives against Egypt, Philistia, Moab, Ammon, Edom, Damascus, Hazor, Elam and Babylon. The fifth part is a supplementary, adding details to the description of Jerusalem's downfall.

Jerfalcon, jér-fá"kn, or Gyrfalcon, a large and bold falcon of the Scandinavian mountains (*Falco gyrfalco*), represented by closely allied species or varieties in Iceland, Greenland and the Hudson Bay region, whose plumage is prevailingly white, with more or less blackish markings, especially about the face. It is one of the largest, strongest and most impetuous of its race; and has always been highly prized by falconers, among whom, by ancient laws, its use was restricted to men of ducal and princely rank. The bird is a rare winter wanderer to the United States from arctic Canada, where it breeds, and survives the winter mainly by killing ptarmigan.

Jericho, jér-i-kō, a once important city of ancient Palestine, near the foot of the mountains, on the west side of the Jordan plain, northeast of Jerusalem. Its name means "city of palms." The site is marked by mounds of sun-dried bricks, and called Tel es-Sultan; gardens and a fine spring are found there. The palms and balsams for which Jericho was formerly famed have disappeared. At the conquest of Palestine by Joshua, Jericho was the key to the country and was miraculously captured, destroyed by fire, and its rebuilding forbidden under a curse. It is now a poor village, much visited by tourists. It has two hotels, a Russian monastery and church.

Jerked Beef, beef cut into strips of about an inch thick, and dried in the sun. This method of preserving meat has been largely adopted in South America and Australia. Cut from the animals when in good condition these strips of flesh dry in the sun before decomposition commences, and will keep for any length of time. In the United States, jerked beef is common in the southwest, where the Indians prepared buffalo, deer and bear meat by cutting in strips and curing in the sun.

Jeroboam (jér-ō-bō'am) I., the first king of Israel, the northern kingdom. Having conspired against Solomon, he was obliged to escape to Egypt, where he remained until the monarch's death. He then returned to lead an insurrection

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against Rehoboam, which ended in the formation of the kingdom of Israel, composed of the 10 revolted tribes. These tribes worshipped at Bethel and Dan, instead of going to Jerusalem. Jeroboam reigned from about 937 B.C. to 915 B.C.

Jeroboam II., king of Israel. He was the son of Joash. He reigned from about 782 B.C. to 741 B.C. His reign was evidently an active one. He was a skilful warrior, and regained territory which had been captured by the king of Aram in previous reigns. It was during Jeroboam's time that Hosea and Amos announced their prophecies.

Jerome, jér'om or jér'ōm, Saint (EUSEBIUS HIERONYMUS SOPHRONIUS), a father of the Latin Church: b. Stridon, between Styria and Hungary, about 331. His parents educated him with care in literary studies and he read the Greek and Roman classics at Rome under the famous grammarian Donatus. He did not escape uncontaminated by the licentiousness of the capital; but soon became inclined to the Christian faith. The catacombs and tombs of the martyrs first excited his devotion. His travels on the Rhine and in Gaul made him acquainted with several Christian preachers, and he was eventually baptized. After a long residence at Aquileia he went in 373 to Antioch in Syria, where he passed through a spiritual crisis and renounced pagan learning, and in 374 retired to the deserts of Chalcis. There he spent four years as a hermit in the severest mortifications and laborious studies. He left his solitude again to be ordained priest at Antioch, but soon after went to Constantinople to enjoy the instruction of Gregory Nazianzus. In Rome, where he became literary secretary to Pope Damasus, he made his appearance as a teacher. His exposition of the Holy Scriptures found favor with the Roman ladies. Marcella and Paula, rich patricians, are celebrated for the learned and ingenious theological epistles he wrote them, and for their rare monastic piety. Paula accompanied him to Palestine in 386, where he founded a convent at Bethlehem; here he remained till his death in 420. His writings show his active participation in the controversies of his day, and his letters give a very vivid idea of the condition of society at Rome. They are full of satiric strictness on the corrupt clergy, and are often as biting as Juvenal or Martial. Many of them are profoundly touching and full of fervent piety; others are lampoons traversed with vehement invective with the spirit of Plautinian ribaldry. His Biblical labors are highly valuable; his Latin version of the Old Testament from the original language is a marvellous achievement, and it may be said that ecclesiastical Latin, with all its peculiar graces, originated with Jerome's Vulgate. His principal claim to the gratitude of the Church lies in the fact that he was really the founder of Latin monasticism.

Jerome, Jerome Klapka, English humorist: b. Walsall 2 May 1861. He was at first a clerk in a railway office, afterward actor, schoolmaster, and journalist by turns. After many discouragements he succeeded in making a popular hit with his book, 'On the Stage—and Off' (1885), largely autobiographical; and his 'Idle Thoughts of an Idle Fellow' (1889) and 'Three Men in a Boat' (1889) made him famous in

America as well as at home. He edited the 'Idler' with Robert Barr (q.v.) (1892-7); 'To-Day' (1892-7); and has published several successful comedies: 'Sunset' (1888); 'New Lamps for Old' (1890); 'Miss Hobbs' (1900); etc.; and also 'John Ingerfield and Other Stories' (1894); 'Sketches in Lavender' (1897); 'Observations of Henry' (1901); 'Paul Kelver' (1902); etc.

Jerome, William Travers, American lawyer and politician: b. New York. He entered Amherst College, but did not complete his course there on account of failing health. He graduated from the Columbia Law School in 1884. In 1888 he was appointed assistant district attorney, in which position he saw much of the political corruption prevailing in the city. In 1890 he was active in the Municipal League, which opposed Tammany; in 1893 was assistant counsel of the Lexow Committee, in 1894 a member of the committee of 70, and manager of the campaign which resulted in the election of Mayor Strong. In the same year the mayor appointed him judge of the court of special sessions. In 1901 he was active in the Fusion campaign against Tammany; and in 1902 was elected district attorney of New York County; immediately after his election he established headquarters in the East Side of New York, in order to be within easy reach of the people who most needed his assistance; in this official position he has done very effective work in the breaking down of the system of protection of vice and maladministration of justice. In 1903 he again took an active part in the Fusion campaign.

Jerome of Prague, Bohemian religious reformer: b. Prague about 1370; d. there 30 May 1416. He was educated at the universities of Prague, Paris, Oxford, Cologne, and Heidelberg; and was in faith and sufferings the companion of the famous John Huss, whom he excelled in learning and eloquence, and to whom he was inferior only in moderation and prudence. His reputation for learning was so great that he was employed by Ladislaus II. of Poland to organize the University of Cracow; and Sigismund of Hungary caused Jerome to preach before him in Buda. He took a zealous part at Prague in the contest of his friend Huss against the authorities, and not unfrequently proceeded to violence, causing the monks who opposed him to be arrested, and even had one thrown into the Moldau. He publicly burned in 1411 the bull of the crusade against Ladislaus of Naples, and the papal indulgences. When Huss was imprisoned in Constance he could not remain inactive, and hastened to his defense. But attempting to return to Prague the Duke of Sulzbach caused him to be arrested in Hirschau and carried in chains to Constance. After an imprisonment of half a year he consented on 11 Sept. 1415 to recant the heresies with which he and Huss were charged. But this recantation did not deliver him, and after languishing a year, he solemnly retracted his recantation. On 30 May he was burned at the command of the council, and his ashes thrown into the Rhine.

Jerrold, jér'old, Douglas William, English dramatist and humorist: b. London 3 Jan. 1803; d. Kilburn Priory, near London, 8 June 1857. He was a midshipman in the navy 1813-15, and

JERROLD — JERSEY CITY

then quitting the service, was bound apprentice to a printer in London. By hard study he made himself master of Latin and Italian, besides acquiring an extensive knowledge of general literature, and at first attempted dramatic criticism. The bent of his genius, however, lay mainly in the direction of dramatic writing. Numberless pieces were produced by him before he was 20, but the first which won decided popularity was 'Black-eyed Susan,' represented for 300 successive nights at the Surrey Theatre in 1829. Among Jerrold's subsequent dramas were the 'Rent-day'; 'Nell Gwynne'; 'The Housekeeper'; 'Prisoner of War'; 'Bubbles of a Day' and 'Time Works Wonders,' the last named one of the most successful comedies on the English stage. He founded and conducted successively the 'Illuminated Magazine' and 'Douglas Jerrold's Shilling Magazine,' also acting as a most important member of the literary staff of 'Punch.' To this he contributed 'Mrs. Caudle's Curtain Lectures'; 'Punch's Letters to his Son'; the 'Story of a Feather.' He wrote several novels, among which are 'The Mad Mode of Money'; and 'Chronicles of Cloverhook' (1846). A selection of his essays edited by his grandson, Walter Jerrold, appeared in 1903. Though a powerful master of satire, he never allowed his wit, whether as an author or in private life, to be tinged with malevolence. Consult: W. B. Jerrold, 'Life and Remains of Douglas Jerrold' (1859).

Jerrold, Walter Copeland, English author and journalist: b. Liverpool 3 May 1865. Since 1890 he has been connected with the editorial staff of the London 'Observer,' and beside editing several reprints from the works of his grandfather, Douglas Jerrold (q.v.); Thackeray's prose works, etc., has published: 'Michael Faraday: Man of Science' (1891); 'Gladstone: England's Great Commoner' (1893); 'Oliver Wendell Holmes' (1893); 'The Triumphs of the Printing Press' (1896); etc.

Jerrold, William Blanchard, English journalist and miscellaneous writer, son of Douglas Jerrold (q.v.): b. London 23 Dec. 1826; d. there 10 March 1884. He edited Lloyd's newspaper for a long period and published: 'Cool as a Cucumber,' a novel (1851); 'Swedish Sketches' (1852); 'Life of Douglas Jerrold' (1858); 'At Home in Paris' (1866); 'Up and Down in the World' (1866); 'Paris for the English' (3d ed. 1868); 'The Cockaynes in Paris' (1871); 'The Best of all Good Company' (1871); 'Life of Napoleon III.' (1874-84).

Jersey Cattle. See DAIRY CATTLE.

Jersey (jér'zi) **City**, N. J., the most important suburb of New York since the annexation of Brooklyn, the second largest city in New Jersey, and seat of Hudson County. It occupies about five miles of the Hudson River frontage opposite lower New York: Paulus Hook, its starting point, is exactly opposite the Battery. It lies on a peninsula between the Hudson and New York Bay on one side, and the Hackensack and Newark Bay on the other; and is limited on the south by Bayonne, which takes up the lower end of the peninsula, and on the north by Hoboken. It has several ferry lines to different portions of New York, some of them operated by the great railroads which have their terminals here—all the roads from the

south and west: the Pennsylvania, Erie, Baltimore & Ohio, Lehigh Valley, Delaware, Lackawanna & Western, New York, Susquehanna & Western, Central of New Jersey, and the West Shore line of the New York Central. The Morris Canal ends here. Jersey City is also the terminal of several of the most important steamship lines between New York and Europe. Its area is 12,228 acres, or 19.1 square miles.

The city lies on a flat meadow about a mile wide from the river back to a sharp bluff; the business section occupies the former, the residence district the latter, with some very handsome streets of costly dwellings—though Grand Street in the business section is a notably beautiful residence street. The municipal improvements are of a high and thorough grade: paving (nearly all the streets are paved, largely with granite and asphalt), sewerage, water supply, etc. The trolley service extends to all the neighboring section of New Jersey. The parks are few and very small, less than in almost any other large American city; but along the ridge in the western part extends the magnificent Hudson County Boulevard, 19 miles long (the entire length of that county from Bayonne up, and five miles of Bergen County), 100 feet wide, and with a noble view of the river and upper New York, as well as the country west. The city hall with the soldiers' monument, the public library, and the Fourth Regiment armory, are among the conspicuous buildings. The intellectual facilities of the city are good, aside from its proximity to New York. It has 27 public schools, besides 10 Roman Catholic parochial schools, and for higher education a public high school, Hasbrouck Institute (1856), St. Peter's (Roman Catholic) College (1878), St. Aloysius Academy, and the German-American School. There is a public library with over 100,000 volumes; and a historical museum rich in colonial documents. The hospitals are the City, St. Francis, and Christ; there are several homes and asylums, and some convents.

The immense commercial and shipping interests of the city, though second only to those of New York, have no separate statistics, the customs report being included in that of the latter city. Its position on the great river, with Newark Bay in the rear and the entrance of Kill van Kull on the south, give it a most favorable commercial position, which has been improved by properly equipped wharves. The Pennsylvania and Erie roads have large grain elevators here. Among the leading industries are those of slaughtering and meat-packing: Jersey City is the meat depot of New York, and has two huge abattoirs, one on the river front and the other on the Hackensack meadows in the northwest. Its slaughter-house products in 1900 amounted to \$5,708,763. Its other manufactures are enormous, the total amounting to \$77,225,116 in 1900. They are exceedingly varied, no one having a great predominance except the tobacco manufacture, over \$6,000,000 a year; other important branches are iron and steel goods, locomotives, boilers, and heating apparatus; bridges, ships, and windmills; planing-mill products, cars, carriages, boxes, and cooperage; brass, copper, and zinc goods, electrical and scientific apparatus; pottery and glass; lead-pencils, and famous crucibles used in all chemical laboratories and smelting works; watches,

SOLOMON'S TEMPLE.
FROM DR. SCHIEK'S MODEL AT JERUSALEM.



JERSEY — JERUSALEM

jewelry, and musical instruments; sugar, and confectionery; mineral waters and patent medicines; soap and candles (a natural annex to the abattoirs), and perfumes; compressed gas; chemicals, paints, and roofing materials; paper, and window-shades; rubber goods; silk thread and goods; oakum; fireworks; printing and writing inks, and varnish; and hundreds of others. There are four national banks, and several State and private banks, with loan and trust companies.

The city has a two-year mayor and a council with only one chamber, called the board of aldermen; most of the other officials are appointed by the mayor, only the city clerk being appointed by the aldermen, and the street and water board elected. The assessed valuation in 1902 was \$100,550,026; the total public debt, excluding the water debt, \$16,205,325; the sinking fund is above \$3,000,000. The expenditures are about \$8,000,000 a year. The largest single item is \$460,000 for schools.

The population in 1850 was 6,856; 1860, 29,226; 1870, 82,546; 1880, 120,722; 1890, 163,003; 1900, 206,433. Of these 3,704 were colored, and 58,424 foreign-born, 19,314 Irish, 18,820 German, 4,642 English, 3,832 Italian.

The site of the city was used only as farming land till into the 19th century despite its remarkable position. In 1802 the entire population was 13 in one house with outbuildings; this was on Paulus Hook, the point opposite the Battery, named after the Dutchman Michael Pauw, who formerly owned it. Here in the Revolution the American fortifications had been taken by the British, and retaken and destroyed in a most brilliant action by "Light Horse Harry" Lee. In 1804 the "associates of the Jersey Company" bought the land, and laid it out in streets, incorporating it as a village with a board of selectmen. In 1820 it was incorporated as the "City of Jersey," still with a board of selectmen; in 1838 it was reincorporated as Jersey City, with a mayor and aldermen. Repeated annexations have brought it to its present territory: Van Vorst in 1851, Hudson City and Bergen in 1869, Greenville in 1873. It obtained a new charter in 1889. Consult: McLean, 'History of Jersey City' (1895); Eaton, 'Jersey City and its Historic Sites' (1899).

Jersey, Island of, the largest and most important of the Channel Islands, lying in the English Channel, and belonging to Great Britain. It is 12 miles long and from 4 to 7 miles wide, and has an area of 45 square miles. The distance to the coast of France is about 12 miles. The interior is mostly table-land and is well-wooded. The principal town is Saint Helier. The island is famous for a breed of cattle. Pop. (1901) 52,796.

Jersey Prison Ship, a notorious, unseaworthy ship, lying in New York harbor from 1776 to 1783, and used by the British as a prison for captured American sailors. Over 11,000 are said to have died of cold, starvation, and inhuman treatment.

Jer'seyville, Ill., city and county-seat of Jersey County, on the Chicago & A. and the Chicago, P. & St. L. R.R.'s, 66 miles southwest of Springfield. It was settled in 1839, incorporated in 1867, and adopted a new city charter in 1897. It has a public library and court-house,

and being the centre of a rich agricultural district, has an established trade in produce, fruit, grain and live-stock. The waterworks are owned by the city. Pop. (1900) 3,517.

Jerusalem (Greek *Hierousalem*. Old Hebrew pronunciation, *Yurushalem*. Tel-el-Amarna tablets, *Uru-sa-lim*; Assyrian monuments, *Ur-sa-li-im-mu*. Meaning certainly "city of Salim"; meaning of *Salim* disputed—probably an Assyrian god; usually assumed as Hebrew "peace," but the name antedates Hebrew. The Greek and Latin *Hierosolyma* is a corruption, from the erroneous supposition that the first syllable is Greek *hieros*, sacred. Hadrian renamed it *Aelia Capitolina*, and its official name was long *Aelia*, even Arabicized into *Iliya*; the Greeks called it *Kapitolias*. Arabic name, *Beit el-Makdis*, or simply *el-Mukaddas*, modern vernacular *el-Kuds*, "the sanctuary," or *el-Kuds esh-sherif*).

The "Holy City" is 33 miles from its port of Jaffa on the Mediterranean, 15 from the Dead Sea, 18 from the Jordan, 19 from David's first capital, Hebron, and 34 or 35 from the old kingdom of Samaria: the pregnant Hebrew history was transacted in the space of a county. It is 126 miles from Damascus. The position of the dome of the Church of the Holy Sepulchre is lat. $31^{\circ} 46' 45''$ N., lon. $35^{\circ} 13' 25''$ E. The city lies in the midst of an infertile, ill-watered district, once (under good government) made prosperous by irrigation, now blighted by Turkish possession. The rainfall is about 23 inches. The climate is hot and irregular—rising to 112° and not sinking below 25° , with an annual mean of 62° —but not malarious; the city is unsanitary and plague-stricken, but from dirt, lack of sewerage, bad water, and unhygienic habits. The only natural water-supply (the drainage sinking in the soft limestone) is from the Virgin's Spring (Gihon), an intermittent natural siphon on a dolomite floor, in a rocky cave 12 feet deep in the face of the eastern ridge; this was carried by a rock and masonry conduit to the rock and masonry Pool of Siloam, 52 x 18, and thence to another, the Old Pool; a shaft within the walls led down to a rock channel communicating with the spring. At present the water-supply is from rain-tanks or "pools," in and out of the walls. The remaining one of three old aqueducts, which carries water when in repair, was built by Pilate. There is little trade except that of local shops for supplying tourists; and the manufacture is chiefly of souvenirs, as olive-wood and mother-of-pearl articles. Indeed, as a commercial location it never possessed any merits, and its greatness was due to original political situation, and partly to its very defects. It is connected with Jaffa (west), Bethlehem and Hebron (south), and Jericho (north) by carriage-roads; and in 1892 a narrow-gauge railroad to Jaffa, with a circuitous course of 54 miles, was opened by a French company.

Jerusalem lies on several hills, rising from a steep plateau (see below), and the floor and slopes of a valley between the two main divisions. The modern city, much less extensive than the old in its best estate, is a rough quadrangle surrounded by a very irregular wall, built in the 16th century by Solyman I., on the lines of the Crusaders' fortifications. It has nominally eight gates, two on each side; the

JERUSALEM

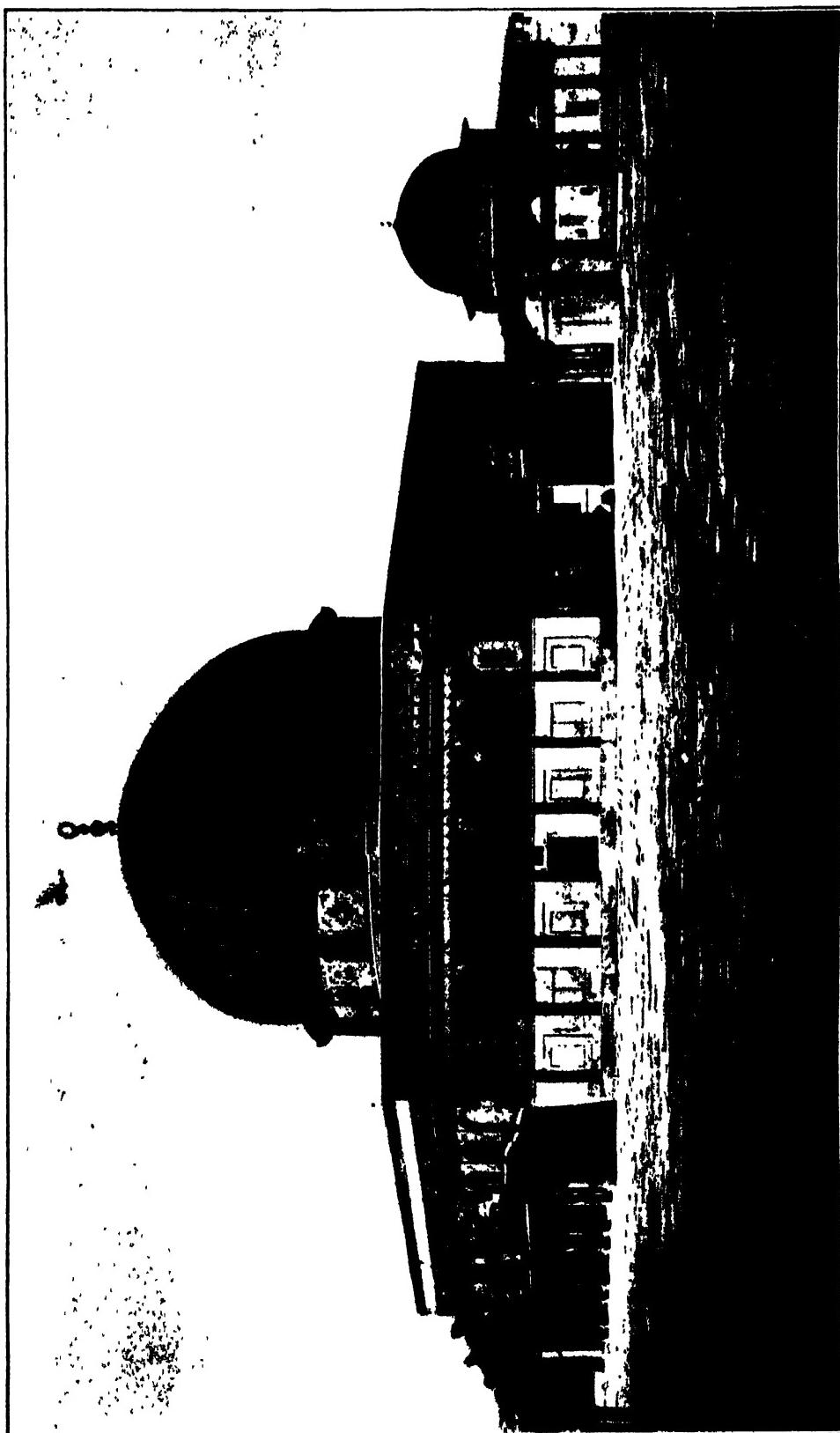
Jaffa and Abd-ul-Hamid on the west (the latter very recent), the Zion and Dung on the south, the Golden (closed up) and St. Stephen's on the east, and the Damascus and Herod's on the north. The city is unevenly divided, by the main street running from the Damascus gate south to near the Zion gate, and that running east from the Jaffa gate to the Haram-esh-sherif, into four "quarters" in which the great religious divisions are segregated: the Mohammedan, much the largest, on the northeast, adjoining the original holy places; the Christian next, on the northwest, where is the Church of the Holy Sepulchre; the Armenian on the southwest; the Jewish on the southeast. The streets are crooked, narrow, ill-made, and dirty, and the city has few except historical attractions; the stream of tourists, however, has developed civilized conveniences such as hotels, banks, mercantile establishments, etc. Several Jewish colonies have been settled in the environs; and since 1858 a quarter has grown up outside the walls on the northwest, approached by the Jaffa Gate, and containing consulates, Christian churches, schools, charitable institutions, etc., but not more sanitary than the old. The city is the capital of an independent sanjak, or Turkish administrative district, immediately subject to the government at Constantinople, and has an executive and a town council with representation of the great religious divisions. It is the seat of Roman Catholic, Greek Catholic, and Armenian patriarchs; the smaller Eastern churches have resident bishops; and till 1887 a joint Protestant bishopric was supported by England and Prussia, with alternate bishops, but on the death of the then incumbent Prussia withdrew from the arrangement, and England continues it alone. The population of the city at the last returns was as follows: Jews, 41,000; Mohammedans, 10,000; Christians, 12,800—made up of 6,000 Orthodox Greeks, 4,000 Roman Catholics, 1,400 Protestants, 800 Armenians 200 Uniat Greeks, and small bodies of Syrians, Copts, etc. Total, over 60,000.

The intense historical interest is centred on memorials of the time or localities of David and Solomon, and of the life and death of Christ. Of the former, the supreme interest is in the Haram-esh-Sherif, the site of the temple, and palace of Solomon and of the later temples. It is a walled area about 527 x 330 yards, with an elevated platform in the centre reached by steps; in the centre is the beautiful Kubbet es-Sakhra, or Dome of the Rock—a wooden octagon with sides of 66 feet 7 inches, decorated on the outside with marble and porcelain tiles, each of the four sides which face the cardinal points having a square gate surmounted by a vaulted arch. Just east of this is the Chain Dome, or David's Place of Judgment. Other domes of interest are near; but the next most notable structure in the Haram is the mosque El Aksa, at the south end. Within it are also a beautiful 15th-century fountain, a pulpit of the same date, a modern mosque called the Throne of Solomon, and the fortress of Antonia. Of the Christian monuments, the most noteworthy is the Church of the Holy Sepulchre, in the Christian quarter, originally built by Constantine the Great over the supposed place of the Ascension; after long oscillation of views, and for a time a general abandonment of the site as the true one, opinion is again favoring its authenticity. Most of the

present structure, however, dates only from the 19th century. There is a rotunda, with a dome 65 feet in diameter, above a small Chapel of the Sepulchre; a number of church buildings, said to include the site of Golgotha or Calvary; and 22 chapels. The Via Dolorosa, along which Jesus is said to have carried the cross to Calvary, follows the present street Tarik Bab Sitti Maryam from St. Stephen's Gate. Several modern churches and other institutions are also worth visiting; but the thronging Scriptural associations—besides those mentioned above, the Mount of Olives, the Pool of Bethesda, the Vale of Hinnom, etc.—overshadow all else.

Topography and History.—About a mile north of Jerusalem, the main north and south watershed ridge of Palestine turns to the west; while a spur called Olivet, having three pinnacles, runs first southeast 1½ miles, and then south 1¼ miles. The space between the two is occupied by a plateau sloping southeastward, and separated on each side from the bounding ridges by a ravine 300 to 400 feet deep, with steep and often precipitous sides. The eastern ravine, separating it from Olivet, is the "brook" Kedron or Kidron (Cedron), which was always a dry bed; the western is the Wady el-Rababi (probably the vale of Hinnom), which after skirting it on the west, turns east along the southern scarp of the plateau and joins the Kedron. Through this plateau from north to south runs a broader and much less deep and precipitous valley, the Tyropeon ("cheese-makers' place") 100 to 150 feet deep, thus dividing it into two uneven sections: the east ridge is continuous, and its northern part was the first occupied; the western part, the "new city," is divided by a lateral branch of the Tyropeon into two summits, a north and a south, connected by a narrow saddle separating also Tyropeon from el-Rababi. The general height may be stated as about 2,500 feet; the eastern ridge is 2,440 feet at the north, and descends southward; the western north summit is 2,490 feet, south summit 2,520. The accumulation of 3,000 years' rubbish, however, has greatly modified the contours of the hills and ravines, obliterating some minor ones altogether. The average depth over the rock levels is 30 to 40 feet, and in the valleys 70, in one case reaching 120.

This plateau, surrounded on three sides by steeply scarped bluffs and crested with hills, was a natural fortress; but it had two defects—it commanded nothing in particular, and its water-supply (one spring intermitting for hours or even a day or two, and that at the foot of a bluff) was very scanty. Probably at the first, as many times since, army after army marched around it, and left it untouched as of too little military significance. We first hear of it on the Tel el-Amarna tablets (about 1400 B.C.), when it is seemingly a little hill fort with a small garrison, possibly with a village also, and the capital of the "land of Jerusalem," apparently a small territory along the watershed. The king, Abd-Khiba, is a vassal of the king of Egypt, and begging assistance against the Khabiri (Hebrews?). Later it is a minor "Jebusite" citadel: Hebron, Bethlehem, Bethel, Gibeah, Jericho, are all more important. But when David undertook to form a consolidated Hebrew kingdom, Jerusalem had the transcendent merit that it lay on the border between Judah and the northern tribes, not historically identified with either; it



THE MOSQUE OF OMAR, JERUSALEM.

JERUSALEM OAK— JERUSALEM PLANK ROAD

was also fairly on the central line of communication, and convenient for action against the Philistines and the desert tribes at once. He made terms with the Jebusites and occupied the hill-fort of Zion on Ophel, near the only available water-supply. Possibly a village grew up on the eastern slope of the hill; but it was small, for the whole levy of Palestine was but 30,000 men (*2 Sam. vi. 1*), and other places held the trade. Solomon greatly increased the size of the town, and built a stone temple for Yahweh and a great palace. Under Rehoboam the place was captured by Shishak of Egypt; under Amaziah by Jehoash, and its walls partly leveled. During the palmy times of the northern kingdom it was held of small account except by the Judahites: it was only one of many places of pilgrimage down to Hezekiah's time, and the northern prophets ignore it and speak of Bethel, Gilgal, and Beersheba. With the fall of its northern neighbor, for the moment its importance and wealth increased; especially it became the one undefiled shrine, never mixed with rites of the native religions, the centre of Jewish religious life, the one place where sacrifice might be offered. In the later days of the monarchy the town spread beyond the east ridge into the Tyropoeon; a second town and a trading quarter grew up. For a long time after its destruction by Nebuchadnezzar in 586 the history is scant and dubious. It suffered heavily under the Persian empire; under Artaxerxes Ochus the temple *may* have been destroyed. Alexander's sacrificing in the temple is mythical; and in 320, Appian says, Ptolemy Soter destroyed the city. Then there was a time of peace and prosperity, culminating in the high-priesthood of Simon II. (219–199 B.C.); after a series of struggles between the Ptolemies and the Seleucids, in which the former took and garrisoned the place and the Jews helped drive out the garrison, the Seleucids obtained Palestine by treaty in 197. When Antiochus Epiphanes undertook to Hellenize Palestine in 169, he took the city, destroyed the walls, plundered the temple, and erected an altar to Zeus in place of that to Yahweh. Judas Maccabæus rebuilt the temple and the walls; again razed by the Greeks, they were again rebuilt by Jonathan. Under the Hasmonean dynasty it extended to the western ridge; there was a new palace and royal quarter of great splendor; the city became the metropolis of the Jewish world, and the one great pilgrim shrine. Then it became tributary to Rome, but at least still a kingdom governed by its own sovereigns; such it was when Jesus was born; but it shortly after became a province governed by a Roman procurator. The Roman system and Jewish feeling were incompatible, aside from any actual misgovernment; and a grand national revolt took place, which in 66 A.D. gained possession of Jerusalem. Vespasian was appointed to repress it; and in 70 A.D. his son Titus, after one of the most frightful sieges in history, with unimaginable horrors, took it, burned the temple, and leveled the city to the ground. Josephus says the city's population was 1,000,000, and Tacitus (probably from Josephus) 600,000; both are absurd, and Josephus' figures are always Oriental. From 30,000 to a maximum 45,000 may be estimated. It remained a ruin for many years. In 131 Hadrian visited the site and ordered it rebuilt; apprehending a restoration of pagan worship, the Jews broke out in rebellion under Bar-

Cochba; and Hadrian, not caring to set up a new centre of Jewish propaganda, made it a Roman colony called *Ælia Capitolina*, and forbade Jews to enter it on pain of death. Thence till the time of Constantine nothing is known of it; except as a Jewish shrine it was nothing. When the empire became Christian, Constantine's mother, Helena, induced him to cherish the seat of Christ's ministry and death; and he built the Church of the Holy Sepulchre (see above). Pilgrims flocked to Jerusalem from all parts, and it became the shrine of Christendom. Captured by Khosru of Persia in 614, it was retaken by Heraclius in 628; but in 637 was taken by the Moslems under the caliph Omar. The line of Arabian caliphs of different dynasties was succeeded by the Seljuk Turks. The Christians were oppressed, the sacred places defiled; to crown all, the overland caravan trade was cut off. Religious feeling and mercantile interest together roused Europe to the crusades, and Jerusalem was taken by Godfrey of Bouillon in 1099, becoming the capital of a Christian monarchy. This maintained a precarious existence till 1187, when the great Saladin put an end to it.

Among the many excellent works on the subject see, for topography and ancient history, the article *Jerusalem* in the "Encyclopædia Biblica," by W. R. and G. A. Smith and Col. Conder; also for topography, Col. Conder in Hastings' "Dictionary of the Bible." See also Warren and Conder's "*Jerusalem*" (1884, Palestine Exploration Fund), containing a large portfolio of plates; Wilson's "*Ordnance Survey of Jerusalem*" (1868), the basis of all modern work; De Vogue's "*Temple de Jérusalem*" (1864); Le Strange's "*Palestine under the Moslems*" (1890, Palestine Exploration Fund), the only book based on Arabic writers; Besant and Palmer's "*Jerusalem, the City of Herod and Saladin*" (4th ed. 1899); and the '*Quarterly Statement*' of the Palestine Exploration Fund.

Jerusalem Oak. See *GOOSEFOOT*.

Jerusalem Plank Road, Engagement near. After the battle of Cold Harbor (q.v.), 1–3 June 1864, Gen. Grant crossed to the south of James River, made unsuccessful assaults upon the Petersburg intrenchments, 15–18 June, and then determined to invest the city partially by a line of works toward the South Side Railroad, and by the evening of the 21st the Fifth corps rested its left on the Jerusalem Plank Road. The Second corps, followed by the Sixth, was moved across the road with the intention of seizing the Weldon Railroad at a point near Globe Tavern next day, and with the expectation of seizing also the South Side Railroad, and cutting Lee's communication with Lynchburg. At night the Sixth corps was in rear of the left of the Second. The orders for the 22d were that the Fifth corps should hold fast its position in front of the Confederate intrenchments, while the Second and Sixth swung to the right, and forward on its left, each division intrenching as it came into line. In the movement the corps commanders at first were directed to keep up connection, then they were ordered to move without regard to each other, each taking care of his own flanks. The Second and Sixth corps moved chiefly through densely wooded thickets; the Second on the right and near the Confederate works; the Sixth at right angles to the Second

JERVIS—JESUITS

toward the Weldon Railroad. Gibbon's division of the Second corps had swung in on the left of the Fifth and entrenched, Mott's division was intrenching, and Barlow's division, on the left, was not yet in position, when the last named was attacked. Gen. A. P. Hill had been sent down the Weldon Railroad to oppose Meade's attempt upon it. He had the three divisions of Wilcox, Mahone, and Bushrod Johnson. Leaving Wilcox to oppose the Sixth corps, which had not come up on the left of the Second, Hill, about 3 p.m., passed Mahone and Johnson through the opening between the two corps and struck Barlow in flank and rear, driving him back in confusion to the position from which he had advanced in the morning, and taking many prisoners. Mott's division, on Barlow's right, fell back precipitately, and then Hill struck Gibbon's left brigade in front, flank and rear, causing it to give way and abandon a battery of four guns. So sudden and unexpected was this attack upon Gibbon that the greater part of several regiments were captured with their colors. Gibbon made an unsuccessful effort to recover the lost portion of his line. Hill returned to his intrenchments, leaving some force on the railroad, and toward evening the Second corps was thrown forward; but it was not until next morning that it occupied the ground from which it had been driven, the Sixth corps, forming on its left, thrown back facing the Weldon Railroad, and about a mile from it. The Union loss on the 22d, confined almost entirely to the Second corps, was nearly 2,000, of whom about 1,700 were prisoners. The Confederate loss is unknown. Consult: 'Official Records,' Vol. XL.; Humphreys, 'The Virginia Campaign of 1864-65'; Walker, 'History of the Second Army Corps.'

E. A. CARMAN.

Jervis, jér'vís, John Bloomfield, American civil engineer: b. Huntington, N. Y., 14 Dec. 1795; d. 12 Jan. 1885. He was employed as axeman on the route of the Erie Canal in 1817; in 1819 became a resident engineer of the middle portion of the canal; was chief engineer of the Delaware and Hudson Canal and Railroad Company, 1825-30; and chief engineer of the Croton Aqueduct, 1836-43. In later life he was consulting and chief engineer of the Cochituate water works, Boston, and of several important railways. He built the Croton dam, the High Bridge at New York, and other notable structures. The town of Port Jervis (q.v.), N. Y., was named for him. He published: 'Railway Property'; 'Construction and Management of Railways'; 'Labor and Capital.'

Jesse, jés'ë, in the Bible stands at the head of the house of David, who was his son. While Saul was persecuting David he took refuge in the land of the Moabites, where Ruth the Moabitess, his grandmother, had lived. In the genealogy of Jesus Christ as given in the Gospels of SS. Matthew and Luke he is mentioned as one of the ancestors, as Christ in the New Testament is hailed "Son of David." This fact has suggested some of the most interesting creations of mediæval art, and what is called a "Jesse window" is a stained glass church window in which Jesse is depicted as the root of a tree which bears as its fruit David and other heroes and saints of the Old Testament, with

the infant Jesus in the arms of his mother on the highest branch.

Jesse, Richard Henry, American college president: b. Epping Forest, Lancaster County, Va., 1 March 1853. He was graduated from the University of Virginia in 1875, was dean of the academic department of the University of Louisiana from 1878 till its union with Tulane University in 1884, in which institution he was professor of Latin till 1891. Since January 1891 he has been president of the University of Missouri.

Jes'sop, Augustus, English Anglican clergyman and author: b. 20 Dec. 1824. He was educated at Cambridge and after taking orders in the English church was curate of Papworth St. Agnes, Cambridgeshire, 1848-54; head master of Helston Grammar School, Cornwall, 1855-9; and head master of King Edward VI.'s School, Norwich, 1859-79. He has been rector of Scarning, Norfolk, from 1879, and is an honorary canon of Norwich Cathedral. As a writer he became widely known by his 'Arcady for Better or Worse' (1881), studies of agricultural life in Norfolk; and among other works of his are: 'Studies by a Recluse'; 'Trials of a Country Parson'; 'The Coming of the Friars' (1885); 'John Donne.'

Jest Book, a compilation of witty sayings and practical jokes. The oldest known English jest book is 'A Hundred Mery Talys' (about 1525). The best known collection is 'Joe Miller's Jest Book, or the Wit's Vade Mecum' (1739).

Jesuit (jéz'ü-it) Relations and Allied Documents, The, a series of 72 volumes on the travels and explorations of the Jesuit Missionaries in New France (1610-1791). The original French, Latin, and Italian texts, with English translations and notes; illustrated by portraits, maps, and facsimiles, and edited by Reuben Gold Thwaites. A republication of great magnitude and importance. The very great value of the work is that of original materials of the most interesting character for the history of North America from 1611, the date of the first landing of Jesuit missionaries on the shores of Nova Scotia. The reproduction of documents takes them in chronological order. The execution of the work by translators, editors, and printers (at Cleveland, Ohio) is every way admirable; and its completion will make a monumental addition to American historical libraries.

Jesuits, a religious order of the Catholic Church whose members, like those of similar societies, solemnly bind themselves to aspire to perfection by leading a life of chastity, by renouncing the possession of all personal property, and by obedience to lawful superiors in all that does not contravene the law of God. A certain number of them add a special vow of obedience to the Pope. They are called the Society or Company of Jesus, the latter designation expressing more correctly the military idea of the founder, which was to establish, as it were, a new battalion in the spiritual army of the Catholic Church. There are no female Jesuits, nor are there crypto or secret Jesuits. Romances are mostly responsible for such myths. Nor does the Society form, as is sometimes fancied, a sort of sect within the Church. R. W. Thompson, ex-secretary of the United

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States navy, in his 'Footprints of the Jesuits' asserts that they are such, and independent of the pope, and in one instance he accuses them of being idolaters. As a matter of fact the Society of Jesus has always inculcated ardent devotion to the pope, the most uncompromising orthodoxy and an intense Catholic spirit. The descriptions of Jesuits as crafty, unscrupulous men constantly engaged in dark plots against all who stand in their way, are inventions of their enemies and have no foundation in fact. Finally they are not monks, as they are sometimes described. Technically they are classed among churchmen as clerics, living according to a rule and are properly regular clerics.

The special object of the Society beside the personal sanctification of its members is to propagate the Christian faith chiefly by teaching and preaching. Their teaching is restricted mainly to the higher studies, and includes literature, mathematics, science, philosophy, theology, and the cognate branches. Their preaching addresses itself to all classes, but, by predilection, and at stated periods in a Jesuit's life, by express injunction, it concerns itself with catechizing the ignorant, and instructing the inmates of hospitals and penal institutions, while it addresses itself also to more cultured and spiritual audiences. One special and characteristic feature of its ministry is known as the "Spiritual Exercises" or "Retreats" which it may be regarded as having introduced, or revived in the modern church, and are now a universal ascetic practice with the clergy and religious communities as well as with a considerable number of the laity. A "Retreat" is a withdrawal from worldly occupations for a more or less protracted period in order to scrutinize the state of the soul and to take means to amend one's life, or to strive for higher Christian perfection. The method of these "Exercises" is laid down in a small manual written by the founder of the Society. The book itself, which is at first sight fragmentary, and only suggestive in its character, is not easily understood or explained except by those who are trained to interpret it.

The Society was founded by Ignatius Loyola, a Spanish nobleman, who after being disabled in fighting for his country, betook himself to the solitude of a cave near the little town of Manresa, Spain, where he passed some months in prayer and severe bodily austerities. Later, desirous of working more effectively for the salvation of his fellow men, he determined to become a priest, and for that purpose studied in the universities of Alcala and Salamanca, and finally in Paris, where he gathered about him six companions, among whom were Francis Xavier, the future Apostle of Japan, Peter Faber, whom, with Ignatius and Xavier, the Church was to honor subsequently as a saint, and also Salmeron and Laynez, who were conspicuous luminaries at the Council of Trent which was then about to be convened against the doctrines of Luther, Calvin, and others who had just then arisen.

On 15 Aug. 1534 these seven men organized themselves into a society, and pronounced their vows in the crypt of a little chapel in what is now Rue Antoine, a short distance below the crest of the hill of Montmartre in Paris. It was only six years afterward that Pope Paul III. gave them and the others who had joined them meantime his solemn approval.

The peculiarities of their organization were the occasion of much antagonism at the very outset on the part of some of the most eminent men of the Catholic Church. The Inquisition strongly suspected its purposes and doctrines. The name of the "Society of Jesus" was objectionable to Pope Sixtus V. Unlike other orders they were to be dispensed from reciting the divine office in common, and were to wear no distinctive habit. The length of probation and the general structure of the Society were unusual. The members were first the professed who were relatively few. In them the governing power resided, and they were distinguished by a special vow of obedience to the pope. Then came the spiritual coadjutors, or priests, who did not take the special vow of obedience to the pope. Preparing for either category were the students or scholastics, and lastly there were lay brothers who were to devote themselves to domestic duties. Those who applied for admission were to pass two years of noviceship, and not one as in other religious orders, and were then admitted to what are called simple vows which could be easily dispensed with by proper authority if the subject were subsequently found unfit. Following the noviceship, two years were given to a review of the classical studies; then came three years of philosophy, mathematics, and the physical sciences; five years of college teaching and four years of theology, to end only with another year of seclusion and prayer, after which the candidate was permitted to take the solemn vows which bound him irrevocably to the order as a spiritual coadjutor or professed. The probation of the lay brothers was protracted to ten years. The Jesuit renounces by vow all ecclesiastical dignities, and accepts them only in unusual circumstances and by express command of the pope, under pain of sin in case of refusal. As the establishment of the Society of Jesus coincided with the Protestant Reformation the efforts of the first Jesuits were naturally directed to combat that movement. Under the guidance of Ignatius so much success attended their work in Germany and other northern nations, that, according to Macaulay, Protestantism was effectually checked. In England where Elizabeth had inaugurated a movement against her Catholic subjects, and previous to that under Henry VIII. the Jesuits stopped at no danger to go to the rescue of their brethren in the faith; and what they did there was repeated in other parts of the world. "In spite of oceans and deserts, of hunger and pestilence, of spies and penal laws, of dungeons and racks, of gibbets and quartering blocks, the Jesuits were to be found under every disguise, in every country; scholars, physicians, merchants, servingmen, in the hostile court of Sweden, in the old manor houses of Cheshire, among the hovels of Connaught arguing, instructing, consoling, animating the courage of the timid, holding up the crucifix before the eyes of the dying."

Such is the testimony of Macaulay, a Protestant historian. Though many died as martyrs on the scaffolds and in the prisons of England and elsewhere, yet their skill in evading detection as well as their courage in living in the midst of their enemies and their great success in winning converts well explain the hatred with which they were regarded in Protestant countries from the very beginning, while it gives us

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the historical origin of the tradition of cunning and deceit which has always been associated with the name of Jesuit.

Under James I. they were accused of complicity in an alleged attempt to blow up both houses of Parliament, and though clearly proven to be innocent of the charge, Father Garnet, who was said to have been cognizant of the plot, was executed, and the accusation is still believed. Guy Fawkes' Day commemorates the event and perpetuates the calumny. It is probably in connection with this occurrence that the supposed Jesuit doctrine of "the end justifying the means" was first accredited to them and the accusation made that "it was their office," as Macaulay assures his readers, "to plot against the thrones and lives of apostate kings, to spread evil rumors, to raise tumults, to inflame civil wars and to arm the hands of the assassin." The first one who is accused of formulating the doctrine of the end justifying the means is Father Waggermann of Innsbruck 1762. Even the murders of Henry III. and Henry IV. of France were ascribed to them, and under Charles II. of England six Jesuits were accused by Titus Oates of conspiracy and put to death. These and other charges have been repeatedly disproved, yet writers of romance, and even writers of history, never fail to find readers credulous enough to accept them as true.

While the Jesuits were propagating the faith in Europe they were sending missionaries to every part of the world to preach the Gospel to heathen nations. Greatest of all these apostles was St. Francis Xavier whom all Protestant writers unite in glorifying and whom the pagans almost worshipped as a deity. His name is still mentioned with enthusiasm among the pagans in Japan and the Occident. The conversions which he effected and the miracles he wrought almost defy belief. It is a testimony to the solidity of his teaching that although Catholicity was apparently obliterated in Japan by a series of bloody persecutions, the French missionaries who entered the country in 1860 found 30,000 Japanese Christians there. In spite of the absence of priests, the doctrines and practices received from Francis Xavier which meant death to profess openly had been handed down from father to son for a period of nearly 300 years. One blot on the reputation of the Society in this field was the shameful apostasy of one of their superiors; but he atoned for his sin by a subsequent martyrdom.

In America the French Jesuits undertook the task of evangelizing the Indians, and at one time had 3,000 civilized and christianized Hurons under their control. In what is now New York, Father Jogues was cruelly tortured and slain on the banks of the Mohawk in 1646. In 1649 Garnier, Daniel and others were shot to death; and at the same time De Brébeuf and Lallement were burned at the stake while their flesh was slashed with knives and their hearts cut out and eaten by the Indians of Lake Superior. Others died from want and exposure. It was Jogues who discovered Lake George to which he gave the name of Lac du St. Sacrement. Later on Le Moyne came upon the salt springs near Syracuse. Marquette discovered the Mississippi which he named the River of the Immaculate Conception. He explored it as far as the mouth of the Arkansas, and returning home was the first white man with his companions to

travel over the territory of what is now the city of Chicago. Wisconsin has erected a statue to his honor. Other Jesuits reached the Pacific coast and established the missions of California which they handed over to the famous Franciscan Junipero Serra when the Society was suppressed. English Jesuits had come over with Lord Baltimore; and before that five Spanish members of the order had been slain by the Indians on the banks of the Rappahannock. The "Relations" of the French Missions have been recently published by an American publishing house and form 72 volumes of missionary and scientific information which the "Atlantic Monthly" considers the most precious material that could be desired for the history of this country. Similar records have been kept by the Jesuits of other nationalities. Marquette's diary and maps of the discovery of the Mississippi decided the controversy between France and England about the possessions of the western territory.

The missions of South America conducted by the Spanish and Portuguese Jesuits were remarkable in their character and extent. Father Ancheta, a native of Brazil, was particularly distinguished for his missionary success as well as his gift of miraculous powers. Peter Claver devoted himself to the thousands of negro slaves who were brought to the port of Cartagena. Other Jesuits traveled through Chile and Peru. Seventy of them on their way thither were said to be killed by Calvinists who intercepted them at sea. But their most famous work was what are known as the 'Reductions' or Christian Commonwealths of Paraguay. The description of these missions forms one of the most brilliant chapters of Chateaubriand's "Génie du Christianisme;" but a recent work entitled 'A Vanished Arcadia' by Cunningham-Graham gives a more reliable and scholarly account of what was accomplished there. Voltaire says: "When in 1768 the missions of Paraguay left the hands of the Jesuits, they had arrived at perhaps the highest degree of civilization to which it is possible to conduct a young people."

"For nearly two hundred years they controlled a district as large as France," writes Cunningham-Graham, "where they had established 32 towns in which there were 160,000 Indians whom they had converted and civilized, teaching them agriculture, the mechanical arts, commerce, and even forming among them a small army of defense. The annual income of the country was about 1,000,000 reales. The missionaries were finally expelled by Charles III. and the country fell back into its primitive condition of a tangled wilderness."

The reasons of their expulsions were first the jealousy of the Spaniards at being excluded from the territory, secondly the anger of the colonists at being prevented from enslaving the Indians, and thirdly the ungrounded suspicion that there were gold mines in the missions. An impression in the royal mind that the Jesuits had reflected on the circumstances of his birth made him an easy instrument in the hands of the enemies of the Society. "Curious as it may appear," writes Cunningham-Graham, "the bitterest opponents of the Jesuits were Catholics, and Protestants have often been their apologists. Buffon, Raynal, and Montesquieu with Voltaire, Robertson, and Southey have written favorably of the internal gov-

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ernment of the mission and the effect it produced. When the Spanish general was sent to dispossess them, he set about it with more preparation than Cortes or Pizarro made for the conquest of Mexico or Peru. But there was no resistance, and all the wealth the fathers had was the poor clothes on their backs." The destruction of these missions was probably a part of the prearranged plan for the annihilation of the whole Society.

The missions of Japan which Francis Xavier had inaugurated continued after his death in spite of the fierce persecutions in which many Jesuits perished. He had been unable to teach China and died on a lonely island off the coast. Ricci, Verbiest, Schall and others carried out his project and became the advisers of the emperor as well as his astronomers, mathematicians and mechanicians. The great bronze astronomical instruments carried off by Germany on the occasion of the recent invasion of that country by the allied powers of Europe were the work of the Jesuits of the 17th century. As soon as the mission was started, great numbers of Jesuits came from Europe, half of them generally dying on the passage. In 1661 they possessed 151 churches and 38 residences there, and had written as many as 131 works on religion, 103 on mathematics, and 55 on physical and moral sciences.

Numberless other missions were established elsewhere; de Nobili for instance lived like a Brahman in India to reach that particular caste, and was almost suspected of apostasy for doing so. He is said to have made 100,000 converts. Jesuits overran the whole Indian peninsula and crossed the Himalayas into Tibet. Africa had long before been penetrated, and one of the first members of the Society was Patriarch of Ethiopia. The present explorers of the Dark Continent find remnants of former missions far in the interior. They had gone from Mexico to the Philippines in the earliest days; they had entered Tartary and Lebanon, and when their own efforts were thwarted they induced others to take their places. Thus De Rhodes, a Jesuit expelled from Japan, founded the Société des Missions Etrangères, a body of secular priests who have given a great number of saints and martyrs to the Catholic Church.

While the Jesuits were engaged in missionary work among the uncivilized peoples of the world they erected splendid churches all over Europe, and furnished such orators to the pulpit as Bourdaloue in France, Vieyra in Portugal, and Segneri in Italy. The "Book of Spiritual Exercises," according to St. Francis de Sales, "has converted as many souls as it has letters." But their apostolic work was not restricted to preaching, and we hear of a single French Jesuit who during his 40 years of ministry had established as many as 146 hospitals for the poor. They founded orphan and Magdalen asylums. They were the confessors of kings and princes and delegates of the Holy See, but they extricated themselves from these honorable charges as soon as it was possible to do so. At the time of the suppression they controlled and directed the majority of the ecclesiastical seminaries of Europe.

The success of the Society in the work of education forms a great chapter in its history. Their method is found in what is known as the "Ratio Studiorum" or Plan of Studies. It is

a complete system of pedagogy and covers the whole field from the lowest class of grammar up to philosophy and theology. The plan was first conceived by Ignatius himself, and subsequently elaborated by one of his successors, Claudio Aquaviva. Compayré, one of the chief pedagogists of the present time, denounces it as a mere system of memorizing. Bacon says of it: "never has anything more perfect been invented." Their colleges at one time covered all Europe, and in the single school of Louis le Grand they had as many as 3,000 students. Kings assisted at its public academic exercises. Among their scholars they can claim some of the greatest men of modern times, as for instance Popes Gregory XIII., Benedict XIV., Pius VII., St. Francis de Sales, Bossuet, Fleury, Flechier, Montesquieu, Malesherbes, Tasso, Galileo, Corneille, Descartes, Molière, Mezzofanti, Muratori, Buffon, Gresset, Canova, Tilly, Wallenstein, Condé, the emperors Maximilian, Ferdinand and others. Even Voltaire was one of their pupils. The disturbed conditions of modern times prevent a similar brilliant showing, but many of the most distinguished Catholic churchmen of to-day have studied in their schools, and notably Leo XIII. who was trained by them from his college classes to the end of his theological course.

Within their own ranks they have furnished great scholars in all branches of philosophy, theology, history, philology, literature, and science. It is sufficient to name such men as Suarez, De Lugo, Bellarmine, Toletus, Lessius, à Lapide, and to note that the treatises of Jesuit writers form the text-books in all the theological seminaries of the Catholic Church to-day. They have written in almost every language and on every conceivable subject, and the mere catalogue of their writers, though not yet complete, already fills more than seven large quarto volumes. Their missionary enterprises were never disjoined from scientific investigation.

Their history is marked by ceaseless activity in launching new schemes for the spread of the Catholic faith, and by absolute fearlessness in opposing error regardless of any consequences to themselves. These two characteristics may explain why even by some Catholics they are regarded as a disturbing element in the church. One of their most noted disputes with churchmen was with the Dominicans on grace, during which the Jesuit doctrine of grace was formulated. The contest lasted for nine years, and although great theological learning was adduced on both sides a truce was imposed by the Pope without any decision being arrived at. Of far greater consequence was their war with the Jansenists. It was chiefly on this occasion that the Society was accused of laxity in their moral code and that their great antagonist Pascal won fame by his "Lettres Provinciales," which like the famous "Monita Secreta" of former times purported to be the private instruction of superiors to members of the order. After this contest their expulsion from France was an easy task, as the Jansenists wielded great political influence and were backed by the irreligious element which was growing rapidly there.

They have been expelled over and over again from almost every Catholic country in Europe, always, however, coming back again to

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renew their work when the storm had subsided; and this fact has been adduced as a proof that there is something iniquitous in the very nature of the organization. Worse still in 1773 the entire order was suppressed by a brief of Pope Clement XIV. and all their goods confiscated. They then numbered 24,000 members and had establishments in all parts of the world and flourishing missions, all of which were immediately destroyed, but not one Jesuit uttered a word of complaint or protest. What is remarkable is that while Catholic popes expelled them they were protected by the schismatic Catherine of Russia, and the Protestant Frederick of Prussia, the friend of Voltaire. This very protection was urged as a reproach against them and as a proof of their guilt.

With the exception of the disastrous financial speculation of Lavalette, which was the sin of an individual and not imputable to the entire Society, as commercial transactions were absolutely prohibited by the statutes, the Society is proved to be guiltless both in its partial suppressions and in its total abolition. This is clear from the very brief of Clement XIV. which dealt the blow. In that document all the charges are enumerated, but not one is pronounced to be true. The Society was suppressed as a political necessity and for nothing else. The encyclopædist of France regarded it as their most redoubtable opponent and had vowed its destruction. "Destroy the Jesuits," said Voltaire, "and we shall make an end of the beastly Church." In this work the Bourbon kings had to be enlisted. Madame de Pompadour, the king's mistress, whom the Jesuits had refused to absolve, influenced Louis XV.; the Spanish and Portuguese ministers wrought on the fears of their sovereigns by forged documents containing threats and plans of assassination, and when all was ready the monarchs gave the pope a choice of suppression of the Society or schism. The pope yielded, and is said by Pius VI. and Pius VII. to have lost his mind in consequence. The vindication of the Society came immediately. The very pope who suppressed them approved of their corporate existence in Russia. Pius VI. who succeeded him in the following year re-admitted them into Italy, and Pius VII. on the fall of Napoleon re-established the Society in all its integrity on 7 Aug. 1814.

Since its rehabilitation the Society has continued to increase in spite of constantly increasing difficulties. In the beginning of 1902 it counted 15,231 members, of whom 6,743 were priests, and 4,542 scholastics in preparation for the priesthood. The general of the Society is Louis Martin, a Spaniard, who was elected in 1893. In the United States they number about 1,800, with colleges and churches in the principal cities and with flourishing missions among the Indians of the Rocky Mountains and Alaska. In Cuba and the Philippines their schools have achieved remarkable success, and the great meteorological observatories of Havana and Manila were established and are at present controlled by them. The chief houses for studies for the American members of the order are at Woodstock, Md., St. Louis, Mo., and Montreal, P. Q.

In some countries of Europe the same hostility still pursues them. In the revolutions of 1830 and 1848 their houses were closed and the members driven out of the country. In the

Kulturkampf inaugurated by Bismarck they were the first victims, and all the efforts of the Centre party have hitherto failed to secure their re-entrance into Germany. Similarly they were the first to be struck in the present religious persecution in France. On the other hand they have been the recipients of countless marks of esteem and affection on the part of Leo XIII., and he has placed the stamp of his approval on the Society by adding very many new names to its already long list of canonized saints and martyrs.

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T. J. CAMPBELL, S. J.

Jes'up, Morris Ketchum, American banker: b. Westport, Conn., 21 June 1830. He was engaged in banking in New York 1852-84, but retired from business in the latter year. In 1881 he became president of the New York City Mission and Tract Society, for which he subsequently erected the DeWitt Memorial Church in Rivington Street, in memory of Rev. T. DeWitt, his father-in-law. He was made president of the Five Points House of Industry in 1872; was a founder of the Young Men's Christian Association, of which he was president in 1872. He was also elected president of the Metropolitan Museum of Natural History in 1881, and of the New York Chamber of Commerce in 1899. To the Metropolitan Museum of Art he has given a collection of native woods valued at \$100,000; to the Woman's Hospital in New York city, \$100,000; and to Yale University and Williams College, large sums likewise.

Jesup North Pacific Expedition, The, an American organization for archæological research, supported by Morris K. Jesup (q.v.), and conducted under the auspices and direction of the American Museum of Natural History. The work began in 1897 in British Columbia. In that year Prof. Harlan I. Smith began to dig in the Thompson River district. In successive years he worked a little farther east, and also around Puget Sound, and down the west coast of Washington. Results of these explorations have been compared and conclusions drawn as to the class of people who inhabited these regions in prehistoric times. Very interesting differences were found among them. Some were more highly developed than others. In particular, one small section east of the city of Vancouver was found to reveal traces of a people much more highly developed than any others of the section, and interesting in many ways to the archæologist. Some of the regions explored revealed the remains of coast tribes; others of interior tribes. At some points these characteristics merged, producing a different

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type. New discoveries of one season explained things not understood in previous explorations. So to gather up missing links and further elucidate the whole region, especially that interesting little people near Vancouver, it was necessary to take up some new territory and thoroughly explore it. Prof. Smith, therefore, went into the Yakima Valley in northern Washington in 1903. On the map this section does not look far from the Thompson River district in British Columbia. And when one reflects how very similar are the white people now inhabiting the two sections and how near the two districts are, it is interesting to find that the prehistoric peoples inhabiting them differed at least as much as the Spanish and the Germans, according to Prof. Smith's conclusions. Not only their culture, but their skulls were different, as known by the skeletons brought back by the expedition. These ancient tribes seemed to have lived, each in its little nook of coast or river valley, for unnumbered ages, never going to see what was on the other side of the mountain; developing each its own little morsel of civilization in its own little way, its life and culture and development modified by the little corner of the earth's surface in which it sat down, seemingly to stay forever. Sometimes shell heaps are found miles in length, and with tree stumps six feet in diameter standing on nine feet of these layers, of which each is only an inch or two in thickness. It took a good many generations of Indians to pile up those successive layers with the shells from their shell-fish dinners. A stump of Douglas fir, over six feet in diameter, stood on a shell heap eight feet below the surface which contained human remains. The tree indicated an age for the top layers of more than 500 years. The material brought back included carved and sculptured pipes, stone mortars, pestles, and sinkers, bone implements used on spears, deer antlers used as handles, stone adzes differing from those found anywhere else, bone needles, shell ornaments, and the like. The expedition also found many paintings and sculptures on rock walls, which were photographed.

Jesus Christ, the founder of the Christian religion. Four documents dating from the second half of the 1st century, the "Gospels," give some account of the life of Jesus, chiefly confined to his brief public work and death. Beyond what they give little is known as to his history. Some of the most important facts are referred to in other writings of the New Testament, especially in the letters of Paul; secular history contains mere references to him; a number of later writings, the so-called "Apocryphal Gospels," purport to give additional information, but they are fictitious and worthless; and beyond a very few sayings which were probably rightly attributed to Jesus, called "Agrapha," tradition has preserved nothing of value which was not embodied in the Gospels. These narratives vary, but are rarely inconsistent: usually they may best be regarded as complementary, and the picture of the life and work of Jesus which may be drawn from them has been accepted as trustworthy throughout Christendom in all centuries, and while on many points confirmation from other sources cannot be expected, the investigations of impartial scholars have rather confirmed its accuracy than invalidated it.

Birth and Parentage.—According to the Gospels, Jesus was born in the family of a carpenter named Joseph, living in Nazareth (q.v.), a small town in southern Galilee. Descent from the line of kings of Judah which began with David is positively claimed for Joseph, and, as some understand the genealogical tables, for Mary, his wife, as well, but during the centuries of national disaster the descendants of David seem to have sunk into poverty and inconspicuousness. While Nazareth was the family home, the birthplace of Jesus was Bethlehem (q.v.), the village of Judea in which David himself was born, a fact which is explained by mention of a census said to have been made under Roman authority while Quirinius was Roman representative in Judea, and to have required that all citizens should be enrolled at the original home of the family. Though no other record of this enrollment has yet been discovered, late discoveries make the fact seem more plausible than it was formerly regarded by some scholars.

The Gospels represent Jesus as born of a virgin, conception having been due to special divine power. The date of his birth cannot be given with certainty as to day, month or even year. Since it must have somewhat preceded the death of Herod (April 4 B.C.), it probably occurred sometime in the year 5 B.C. (possibly 6). It is reported that Mary, in a village strange to her, and at the time overcrowded with visitors, could find no place to lay her new born babe but in a manger. But at the presentation in the Temple for the offering of the sacrifices which Jewish ritual prescribed after childbirth, the infant was joyously hailed by Simeon and Anna, aged saints profoundly possessed by the common Messianic expectation of the nation at that time, and, as shepherds from not far away had come in the night of his birth in obedience to a vision of angels, so, later, the Magi (q.v.) from afar guided by a star sought the child to offer him obeisance and rich gifts. This visit of the Magi, however, made Herod aware of the birth of a child who might grow up to be a dangerous rival of the dynasty which he hoped to found, and it is handed down to us that unable to trace it he ordered the slaughter of all the infants of the village up to the age of two years. But his parents, divinely warned, had taken the child to a safe refuge in Egypt, where they remained till the death of Herod, presumably only a short time. If they returned in the expectation of bringing him up in the ancient home of his line, they were deterred by fear of Archelaus who had succeeded his father as ruler in Judea, and consequently they turned aside to Nazareth where they were secure under the milder rule of Antipas.

Early Manhood.—Of the life of Jesus up to manhood nothing is known, except the mere mention of his visit to Jerusalem when 12 years old. It can be supposed only that he was subjected to the natural influences of a religious Jewish family of the time, of synagogue and of school, of a village at once quiet and yet close to the thronging traffic on one of the great thoroughfares of that age, and finally of the work of a carpenter, for such he is said to have been, till 30 years of age. It was about this time, possibly in the year 26 (or 27) that John the Baptist (q.v.) began his public career, and at once aroused great religious and patriotic fervor in the nation.

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The careers of neither John nor Jesus are intelligible without an understanding of the expectant attitude of the Jewish people in the 1st century. The ancient prophets of the nation had centuries earlier foretold a renaissance of the Hebrew kingdom under a descendant of David, through the generations this hope smouldered in the hearts of the people, only fanned to a brighter flame by blasts of persecution and national disaster, and the whole influence of the sect of the Pharisees (q.v.), popular and powerful out of proportion to their numbers, increased its intensity under Herod and his successors. The people were ready to be fired by the proclamation so strikingly made by the gaunt desert-dweller that the fulfilment of the national hopes and dreams was near: "The kingdom of heaven is at hand." The preaching of John was, however, no less moral and religious than patriotic. His message was "Repent"; let the nation prepare by penitence to meet the king coming in his kingdom. This prophetic voice set the country in a blaze. Throng gathered to listen to the new preaching and by a striking symbol, a plunge in the rushing Jordan, to pledge themselves to the new movement. After a time Jesus joined the crowds which attended the ministry of John. It is impossible to say what connection may have existed between John and Jesus. Not only were their families related, but there may have been constant intimacy. John, however, based his later testimony as to Jesus, not at all on his own knowledge of him, but entirely on the divine revelation which was his commission. Jesus offered himself for baptism, insisting that the reluctant preacher should perform the rite, and thus pledged himself to the Coming Kingdom. While it is not claimed that the wonders which attended the baptism were known to others than John and Jesus himself, the story of the Gospels is that a heavenly voice asserted the Messiahship of Jesus, and that with the appearance of a dove the Divine Spirit came to him. The conviction of his mission to his nation and the world was no new thought to the carpenter of Nazareth, and it was with this thought in mind that he recognized the significance of the Baptist's public appearance, joined his auditors, and submitted to the ordinance which he administered. Yet it is not surprising, on the other hand, that he felt constrained, when his own conviction was confirmed, to seek the desert of Judea that alone he might adjust himself to the new responsibilities and burdens of the mission which he must undertake. Amid the solitude of the barren rocks and gloomy caves of that desolate region he meditated and struggled. Of this period we know only the striking story, necessarily autobiographic in origin, in which he depicts the struggles which he underwent as due to Satan's influence. Temptations thus forced in upon him to selfish use of his power, to sensational fanaticism and to compromise with evil in order to advance his ends, were successively resisted, and at the end of 40 days he came forth the victor in all these spiritual conflicts, ready to enter actively on his ministry.

The Ministry.—Jesus returned to the Jordan where John was still at work, and aided by his testimony associated with himself a little group who instinctively recognized in him a future leader of the nation. He went from there first

to his home district, where he and his companions were guests at a wedding at Cana, a little town which has been hallowed in all the Christian centuries by John's report of the changing of the water into the wine needed for the entertainment of the company in the prolonged merrymaking incident to such an occasion. Then, as it was near the Passover time, Jesus, accompanied by his mother and brothers as well as his few followers, after staying a short time at Capernaum, went on to Jerusalem. How long he remained in or near the capital city must continue a matter of inference from a few doubtful phrases, but it seems most probable that he remained in Judea for some months, perhaps from April to December. The chief events ascribed to this period are the first cleansing of the Temple and the night interview with the influential rabbi, Nicodemus, and while the effect on city or nation was not great, it was presumably at this time that Jesus formed the strong friendships in Judea, to which incidental reference is often made afterward. The closing of this portion of his ministry seems to have been due, on the one side, to the hostile jealousy of the dominant Pharisees which would hinder success in Judea, and, on the other, to the imprisonment of John the Baptist which made it possible for Jesus to work in Galilee without what might have seemed competition, and, indeed, made it advisable for him to take up the work which John had been obliged to drop.

On his return to Galilee Jesus soon recalled his disciples, who, if they had accompanied him throughout his work in Judea, had scattered for a time to their homes, and associated himself with them in a companionship which was thereafter unbroken till his death. He made Capernaum the central point of his ministry, returning thither from each of his repeated tours throughout the many scores of cities and villages which then existed in Galilee. Wherever he went the keynote of his preaching was the same as John's had been, "Repent, for the kingdom of heaven is at hand;" but as time passed his instructions, exhortations and warnings swept throughout the whole scale of human experience and touched every note of religious and moral truth. The keynote of his teaching about God was his love, infinite, untiring, eternal. On the ground of this love he proclaimed pardon to every penitent, even though a harlot or an outlaw. But this certainty and freeness of forgiveness was not allowed to diminish the loftiness and imperativeness of the standard of duty which he held up. Indeed, the high moral tone of his teaching, accompanied as it was by a constant and insistent demand for absolute sincerity, and his disregard for all mere forms, without the spirit in particular, his teaching and practice in reference to fasting, ceremonial purifications and Sabbath keeping, combined to set against him the Pharisees and through their influence the leaders and officials of the nation.

Popularity.—For a long time his popularity was great and throngs gathered to see and hear him, attracted in part by the reports of his miracles. Far and wide the stories were told that diseases yielded to his command, that the fevered, the palsied, the blind, the deaf and dumb, the lepers, the demonized, were restored to soundness, and, later, that on repeated occa-

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sions he brought the dead to life. But these great works were distinctly secondary. He was first and foremost the Prophet of Nazareth, the Preacher. As such he spoke with peculiar attractiveness and power. His style was simple and direct, and his discourse was frequently adorned with unequaled parables, illustrations drawn from nature or common life, which, though sometimes veiling the truth from the thoughtless, sometimes added immensely to its clearness and effectiveness. His activity as a preacher at first won him steadily increasing popularity among the people at large, until, about two years after his work began, 5,000 men, whose hunger had been satisfied by his power on the lakeside, determined to make him king. But in this purpose they lacked all real sympathy with the character and aims which Jesus exemplified. The kingdom which centuries before the prophets of the nation had foretold was a kingdom to be sure, but a kingdom which should be based on a right relation of its subjects to God and existing only to serve the divine ends. The Jews as they read these prophecies had seen in them, only something political, worldly and selfish. Now when Jesus in fulfilment of prophecy had come to offer himself to the nation as its promised king, he would be king only as his kingdom might be the expression and instrument of a religious people, deeply, purely, unselfishly religious. So at the very climax of popular favor his clear vision instantly recognized how widely their ideals and purposes differed from his.

The Twelve Apostles.—For some time this condition of affairs had been anticipated, and Jesus had laid his plans and shaped his work accordingly. Since the Jewish people would have no such kingdom as he was about to establish, he had several months previously organized under the name of apostles a group of 12 of his disciples, to whom he would impart himself, and on whom he would so far as possible stamp himself, that they in turn might repeat his activity in their relations to others. Although he retained the name kingdom, what he looked forward to establishing was not a political but a spiritual community or body.

After the choice of the apostles the discourses of Jesus had been largely shaped for their special benefit: after his rejection of the offer of kingship from the unappreciative multitude, who in turn instantly deserted him when they saw that he would refuse to gratify their selfish hopes, his work was mainly for the benefit of the twelve, although he neglected no opportunity which came within his reach of trying to touch the soul of the nation or of individuals. Much of the last year of his life Jesus spent in seclusion. He made a journey, doubtless traveling in leisurely fashion, northwest from Capernaum to Sidon, returning as it appears by a roundabout route through the Decapolis, and another journey northeast to Cæsarea Philippi; some time was spent in Perea to the east of the Jordan; and though he seems more than once to have shown himself conspicuously in Jerusalem or its immediate neighborhood, yet during most of the time which he spent in Judea he secluded himself in an obscure village named Ephraim.

So far as the work of Jesus was concerned, the most significant event of the last year, if not of all the three years of his ministry, was the conversation with the apostles near Cæsarea

Philippi as to the opinion of him which generally prevailed and as to their own convictions. While Jesus is reported at least once to have claimed to be the expected Messiah, and while this claim was necessarily implied in much that he had said of himself, and while some of the twelve had very early expressed the opinion that they had found the one of whom Moses and the prophets had spoken, yet this view had never found expression as their matured conviction. Such expression Jesus at last sought. His first question was as to the common sentiment concerning him, and the frank answer was that while he was generally recognized as one far beyond the ordinary, he was not at all recognized as the Promised One. In face of this answer Jesus pressed the further question, "What am I to you?" and the answer of Peter, one speaking for all, was that he was the Christ. This answer assured the ultimate success of his mission, for these followers would win more. But he could not fail at the same time to foresee the irrepressible conflict between himself and the leaders of the nation, and so, relying on their faith in him as the Christ, he immediately began to familiarize them with the fact of his death, though this only confused and offended them, and at the same time to add promises of resurrection which they do not seem to have grasped at all.

The apparent failure of the mission of Jesus which he thus foretold, culminating as it did in his rejection and death, was due alike to what he was, what he taught and what he demanded. He himself was devoted with absolute single-mindedness to his work, sincere, unselfish, loving, beneficent, and pure with such perfect and manifest purity that only a few voices of detraction have ever been out of harmony with the else unanimous recognition and assertion of the sinlessness of his whole life. His teaching, while not in all respects original in matter or form, was in spirit and effectiveness such an advance on the Old Testament which he confirmed or the rabbis with whom he largely agreed that it seemed "a new teaching." He demanded of others the same perfection of sincerity, altruistic self-forgetfulness and supreme devotion to the will of God which he himself practised, and he as sternly denounced hypocrites as he tenderly welcomed penitents. All his teaching came with a unique tone of authority and this was made more significant by the claims which he advanced for himself. He occasionally asserted and constantly implied that he was a special messenger from God and unique representative of him, and from time to time he distinctly claimed divine attributes and powers. Thus he spoke; to confirm this he pointed to his miracles; as such he held himself up as the proper object of supreme and absolutely limitless devotion; the recognition of his supremacy he demanded of all and gladly accepted from his disciples, a self-assertion which in view of his sincerity and simplicity of soul is as significant as in view of his transparent honesty coupled with unsurpassed sensitiveness to evils is the absence of ever confessing a fault. Between such a one with such a message and such demands and the rulers of the nation at the time there was necessarily an irreconcilable antagonism which could end in no way but in his death.

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The Messiah.—In the spring of the year 29 (possibly 30), after Jesus had been before the public for three years, the task of implanting the spiritual kingdom in the hearts of the select 12 was so far completed that it would be permanent, and at the same time the conflict with the authorities could not wisely be longer postponed. Accordingly Jesus went up to Jerusalem to the Passover with the throngs which assembled at that time from every part of the country. While he gave repeated proofs that in spirit he was walking in the shadow of the cross which he foresaw at the end of the road, yet this journey, unlike those which had preceded it, was intentionally made, by the sending of 70 messengers before him to proclaim his coming, a significant progress through the country. Reaching the neighborhood of Jerusalem, he stopped for the Sabbath at the neighboring village of Bethany, to which he returned each night till the end, and then on the following day he made a somewhat formal entry into the capital city. It needed only that he should mount a riding ass that those who accompanied him should be reminded of an ancient prophecy, and they, with another throng which came out from Jerusalem to meet him, acclaimed him as the promised and coming king, carpeting the road before him with green branches from the trees at the roadside and with their own clothes thrown before him in the zeal of their loyalty. Thus they led him to the Temple, where the procession dispersed. While informal and at first thought only a failure in its lack of definite result, this "triumphal entry" had deep significance as a public claim of his right to rule the nation as God's appointed representative, and he stopped short of assuming this office only because he desired and demanded first the acceptance of him by the nation. During the days that followed he repeated this claim in various ways; again he drove out of the Temple the huckstering crowds so out of harmony with its proper use, and in prolonged controversy with the representatives of all the parties of the time he bore himself as their Master and proved himself such. All this goaded his enemies at last to action, and through the treachery of Judas Iscariot, one of the inner circle of 12 disciples, almost at once an unlooked-for opportunity presented itself to them.

The Last Supper.—On Thursday evening of Passover week, after special precautions to keep secret the place of their assembling, Jesus sat down at a last supper with his apostles to what he knew would be his last interview with them before his death. While the traitor has gone out to secure his arrest, he pours out his soul to the others in words too tender and profound for their comprehension; he warns them that they will speedily desert him to go alone to his fate; he tells them something of the unique significance of his death in language which contains in germ the later doctrines of the Church, on this point; presenting them bread and wine, he instituted the second of the two rites of the universal church and finally commends them and all future believers in him to God in a prayer of incomparable elevation and pathos. He then went out to a resort familiar to him and his friends, an olive grove named Gethsemane in a valley close to the walls of the city. There

the horror of the coming hours, not craven fear of death, but distress at the very thought of the tremendous experience which he must undergo in soul, drew from him a thrice repeated prayer of such intensity that the very blood was forced through the pores of the skin, but on the prayer followed serenity of resignation and purpose which continued unruffled to the end. Then he awakened his disciples who to his disappointment had repeatedly been overcome by sleep and so had left him to his spiritual distress without even the sympathy of his friends, and went to meet the force of Roman soldiers and Temple guards which in needless precaution the officials guided by the traitor brought to seize him. He quietly submitted to arrest, and his followers struck but a single blow in his defense and then scattered in the darkness, two of them, however, John and Peter, following at a distance, the latter only to deny later all discipleship and even acquaintance.

Trial for Blasphemy.—While some details of the four accounts of the trials of Jesus are obscure, if not inconsistent, yet their general course may easily be made out. At the house of the high priest Caiaphas, or of the still more influential Annas, his father-in-law, and an ex-high priest, there was before daylight an informal session of all the Sanhedrin who could be gathered. Unable to find even perjured testimony which was sufficiently consistent to warrant his condemnation, the high priest as president of the great court of the nation put Jesus under oath, and asked him if he claimed to be the Christ. Firmly and positively Jesus answered that he was, whereupon his enemies without even pretense of investigation declared this claim to be blasphemy for which according to Jewish law he must die. But this verdict would be legal only if rendered in the daytime, and so, having been left during the interval to be the object of mockery by the guards, as soon as the day broke, he was formally arraigned and condemned. As, however, the right to inflict the death penalty had been reserved to himself by the Roman procurator, in order to accomplish their purpose they must secure his condemnation of Jesus in addition to their own, and accordingly the Sanhedrin conduct him to Pilate and demand his execution. But Pilate refused to order his execution without investigation, and when they charged him with instigating sedition against the Roman government, the judge instantly recognized their malicious insincerity and the innocence of the prisoner. In his consequent desire to release him Pilate in turn pronounced him innocent; sent him to Antipas, who only made sport of him and returned him: vainly tried to stir up the populace to demand his release according to the custom that a prisoner should be released at Passover time; ordered him scourged in hope that that cruelty would satisfy his enemies; displayed him bloody from the torturing lash and crowned by the soldiers with thorns in cruel jest, fancying that this sight would surely evoke pity; but finally, terrified at the mutterings of the crowd and fearing lest should he persevere charges might be made to the emperor against himself, Pilate ordered the crucifixion of Jesus.

The Crucifixion.—The execution took place at once, scarcely later than the middle of

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the forenoon. Although so far weakened by the sufferings of the night and morning that the sufferer fainted under the cross which, as was customary, was laid on him to bear to the place of execution, he bore himself throughout with majestic patience and dignity. Under the jeers of his triumphant enemies, in sight of his mother and friends, in the unexplained and portentous darkness which beginning at noon lasted for hours, amid the indescribable physical tortures of the cross, he spoke but to pray forgivingly for those who were the agents of his suffering, and to commend his mother to John, her nephew and his most intimate and beloved disciple. At mid afternoon he uttered a cry to God, "Why hast thou forsaken me?" which can be understood only as expressive of intensest soul agony. As if this agony culminated and ended with the cry, he then spoke calmly of his thirst and took the drink which a sympathetic bystander pressed to his lips, then commanded his spirit to God, and with a loud shout expired, it would seem with a literally broken or ruptured heart. Although death seldom came so soon to the crucified, yet the fact is undeniable in the case of Jesus, for when somewhat later the criminals who had been crucified with him received a blow intended to hasten their death, the soldiers recognized that he was already dead, and yet one of them thrust a spear deep into his side, apparently touching the heart, and on Pilate's inquiry the officer in charge certified to his death. By leave of the governor two members of the Sanhedrin, who were secretly disciples, took down the body and hurriedly but reverently buried it at the close of day not far from Calvary, where he had been crucified, in a rockhewn tomb, which later was officially sealed.

Of the facts relating to Jesus during the next few weeks, no less than five (if the last verses of Mark are by another hand, then six) separate accounts are preserved, no two precisely agreeing, but, on the other hand no two being mutually contradictory, and one of these accounts, that of Paul, was written within 25 years of the events narrated. It is told that first women going at the dawn of Sunday entered the open tomb but found not the body of Jesus; that later Peter and John also found it empty; that Peter, then ten of the apostles together, and also two other men miles from Jerusalem, as well as Mary Magdalene, saw Jesus that same day in recognizable human form and talked with him; that these appearances and conversations were repeated at different places and in varying circumstances for about six weeks; that on one occasion he was seen by as many as 500 at the same time, some of whom were at first doubtful as to the facts; and that then these manifestations entirely ceased, except for the experience of Paul. It is certain that the disciples in these few weeks had come to be convinced that Jesus had actually been with them and that consequently they passed out of a state of gloom and despair into joyous and unflinching boldness; that the belief in the physical resurrection of Jesus was an essential part of the creed and preaching of the primitive church; and that the first day of the week became the Christian day of worship. No plausible explanation of these facts, of the empty tomb; of the reports and convictions of the

disciples; who claimed to have seen and talked with Jesus in human form, especially of the case of Paul; of the revulsion of feeling on their part; of the consequent foundation of the Christian Church, and of the consecration of the first day of the week, has ever been given except that after his death Jesus, in this as in so much else unlike all other men, entered by resurrection and later ascension upon a new course of life and a new course of activity. Without the resurrection as well as the life and death of Jesus historical Christianity could never have come into existence; by it he became the founder of the Church and the dominating personality of the ages.

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Jesus Christ, Logia of, the sayings of Christ, a title given to certain first century papyri, discovered in the course of excavations at Oxyrhynchus carried on under the direction of Professors Grenfell and Hunt. The first find of these logia was made in 1897, but in 1903 a second collection was discovered. It has been suggested that these may be remains of the so-called Gospel of St. Thomas. Each of the recently unearthed sayings, like those of 1897, is introduced with the sentence 'Jesus saith.' These sayings are for the most part new, though one of them is in part known to have occurred in the Gospel according to the Hebrews. The new sayings are not so well preserved as the 1897 papyrus, in which the deep blackness of the ink was wonderful. In the later discovered papyri the ends of the lines are lost throughout, but there is this advantage: the introduction to the entire collection of sayings, of which both papyri are probably a part, is given, stating that these were the sayings in the logia which Jesus spoke through Thomas and perhaps another disciple.

The first saying is that one of which a part is already known to have occurred in the Gospel according to the Hebrews. It is one of the most remarkable sayings ascribed to Christ. It says: "Let not him that seeketh cease from his search until he find and when he finds he shall wonder; wondering he shall reach the kingdom and when he reaches the kingdom he shall have rest."

The kingdom of heaven is also the subject of the second saying, which is much the longest and most important. The kernel of it is that most remarkable and profoundly mystical saying recorded by St. Luke alone: "The Kingdom

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of God is within you," but the saying in the papyrus appears in quite different surroundings from those attributed to it by St. Luke and extends far into another region. When published the sayings will doubtless be widely discussed by the critics as the logia of 1897 were. They are of enormous interest on account of the variations they disclose from the accepted texts.

One variant which Prof. Hunt quotes as of great value is Luke xi., 52, which reads: "Woe unto you, lawyers; for ye have taken away the key of knowledge, ye entered not in yourselves, and them that were entering in ye hindered." The papyrus, however, reads: "Ye have hidden the key of knowledge, ye entered not in yourselves and to them that were entering in ye did not open."

The recently discovered papyrus contains part of the discourse of Christ closely related to certain passages in the Sermon on the Mount in St. Matthew and to the parallels thereof in St. Luke; and secondly, part of the conversation between Christ and his disciples. The latter presents a striking resemblance to the well known story recorded in the Gospel according to the Egyptians and in the uncanonical gospel used side by side with the canonical gospels by the author of the Second Epistle of Clement, which was written about the middle of the second century. It consists of an answer to the question put in the Gospel according to the Egyptians into the mouth of Salome; in the uncanonical gospel quoted by Clement into the mouth of some unnamed person, but by the recently discovered papyrus into the mouth of the disciples. The question, with some variations of form between the three, was: "When will Christ's kingdom be realized?" The answer as recorded in the Gospel according to the Egyptians was: "When ye shall trample on the garment of shame; when the two shall be one and the male as the female neither male nor female." The papyrus differs somewhat from this, and incidentally shows that the interpretation generally given to "When ye shall trample on the garment of shame" is incorrect. It is usually considered to signify "when ye put off the body; that is, to die." But the papyrus shows that the real point lies in a mystical allusion to Genesis iii., the phrase meaning, "When ye have returned to the state of innocence which existed before the fall."

Jesus College, Cambridge, England, founded by Alcock, bishop of Ely, in 1496. It has 16 foundation fellowships, open without restriction to all his majesty's subjects. Five were of the original foundation, and the others have been added by subsequent benefactors. Six of the fellows are required to be in orders. The mastership and one fellowship are in the absolute appointment of the bishop of Ely. To the other fellowships on a vacancy the master and fellows nominate two candidates, one of whom is elected by the bishop. There are numerous scholarships.

Jesus College, Oxford, England, founded by Queen Elizabeth in 1571 on the petition of Dr. Hugh Price, treasurer of St. David's, Wales, who left lands for the maintenance of a principal, eight fellows, and eight scholars. It was increased by different benefactors until it came to consist of a principal, 19 fellows, and 18 scholars; but by the ordinance of the university

commissioners the fellowships have been reduced to 13, a half of which as near as may be are to be filled up by natives of Wales, the other to be under no restriction by reason of birth. A fellowship founded by Charles I. for natives of Guernsey and Jersey has been converted into two scholarships for natives of these islands or persons educated at Elizabeth College, Guernsey, or Victoria College, Jersey. This was the first college founded on Protestant principles.

Jesus Island, Canada, an island in the Saint John River not far from where it joins the Saint Lawrence River; area, about 1,200 square miles.

Jet, a mineral, which is found in compact masses so hard and solid as to be susceptible of being turned on a lathe and manufactured into ornamental articles. It has been worked for centuries in Whitby, England. It is found in thin laminations, which subsequently thicken out to 2 or 3 inches in the upper lias strata in that neighborhood; a lower bed, from which the best quality is obtained, has a thickness of 20 feet, and is known as jet rock. Jet is supposed to have been worked in England as far back as the time of the Romans. Jet rosaries and crosses were common in the Abbey of Whitby when it was a resort of pilgrims. The jet manufactures of Whitby fell away about the time of Queen Elizabeth, and were revived in 1800. It is also manufactured at Scarborough, England.

Jetties are dikes at the mouth of a river or across a harbor bar to increase the riverine or tidal current by narrowing the channel, and thus scour out a deeper bed, to accommodate navigation. Single jetties are solely at the mouths of rivers with strong currents, to deflects these to one side of its natural channel, but in most rivers, and in all harbors they are double, forming an entire artificial channel. Briefly, the physical principles are: The power of water to transport solid matter varies as the square of its velocity, so that increasing the strength of current two fifths will about double its sand-carrying capacity; the velocity increases with increase of slope and decrease of friction; the slope is increased by narrowing the channel, since it forces flood waters inside or outside to rise higher at the entrance, and the friction decreases as the width of the channel; and lastly, if a channel of a given depth and width passes a given quantity of water, then a narrower channel involves either a permanently greater height of water if the bed were rigid, or the scouring of the bed to a depth which, multiplied by the new width, will produce an equal cross-section with the old. The increased slope and the correspondent velocity vanish as the water cuts a deeper basin; but the velocity due to lessened friction does not, nor do the deepened channel, the greater discharge through it, and the greater tidal fluctuation due to the larger basin. The channel is scoured along until the deepening sea establishes an equilibrium of action.

The system is not new. A number of important European rivers were jettied even before the middle of the last century, and others not much later. The Danube at Sulina had been deepened to 21 feet, from 8 feet before; and in 1874 Eads found seven German rivers, including the Oder and Vistula, improved so that with

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initial channels of 4 to 7 feet, they then had 13 to 23.5. Several of these are still deeper now, the result increasing somewhat for many years under the same conditions. The Neva in Russia has also such works; as also the harbors of Calais and Dunkirk in France. In the United States a very great number have been constructed, both for rivers and harbors; the greatest of all are the jetties at the mouth of the Mississippi, and as the general principles are alike in all, these may be briefly described.

The Mississippi discharges its waters to the Gulf not by one channel, but in the main by three, running through "passes" 12 to 17 miles long from the delta land to the sea, and widely divergent. The largest is the Southwest Pass; next the easternmost, Pass à l'Outre, with two branches. In the middle is the smallest, South Pass, 600 to 800 feet wide, and taking not over a tenth the total discharge, with a shoal at its head only 15 feet deep, and a bar at its mouth only 8 feet; so that, with 30 feet of water through the delta, it was unserviceable for deep-water navigation. Capt. James B. Eads offered to build jetties to deepen the bar at Southwest Pass from its then 13 to 28 feet; but Congress preferred South Pass, as cheaper and simpler, needing work only at the head and foot. Work was begun in June 1875, and within nine months the water was 13 feet on the bar; by 1879 it was 29 feet; it is now over 30.

The west side of the pass had silted up into land 4,000 feet farther out than the east, so that the west side of the two parallel dikes built out to 30 feet depth in the Gulf was about 7,800 feet, while the east was 11,800. First piles were driven in two rows 1,000 feet apart (the piles 12 feet apart) to mark the lines of the projected jetty-walls. Then mattresses were built, of willow branches, or young willows 15 feet long, cut with the leaves on, laid in four courses, each crosswise to the next, and fastened together at top and bottom by pine planking $2\frac{1}{2}$ inches thick, dowelled with hickory pins; this compressed the willows to a thickness of about 2 feet, and their brush-ends projected 3 or 4 feet. These mattresses were 100 feet long; for the bottom course they were made 50 feet wide, but steadily narrowed for each of the four courses at first needed to bring them to the surface of the water, the top one being 20 feet wide. Wider ones were used in deep water. These were built on shore, on ways as for launching boats; towed by tugs to the places indicated by the line of piles, and sunk by loading one or two tons of stone on top. Once down, they speedily filled with sediment and became solid. At the sea ends foundations of mattresses 200 to 300 feet broad were laid. For two or three years these stone-laden mattresses gradually sank in the soft bottom, and new ones were added at the top to bring the surface even. The willows not imbedded in sediment were revetted with stone. Where exposed to storms, they were considerably sloped, and more thoroughly revetted. The sea ends were afterward capped with concrete blocks. The jetties have undergone considerable repairs since then, but have essentially done their work of making the river navigable for large vessels.

One of the difficulties was this: If obstacles were placed in the way of a free flow of water, the river would by so much at least desert this pass and run through the others; so that their

heads had to be closed up to a sufficient extent to prevent this. Plans for improving the Southwest Pass in like manner have been prepared by the government engineers, but have not been executed.

At the mouth of the Brazos, west of Galveston, Texas, an ingenious plan was adopted for avoiding interference in the work by flood-tides: A long trestle was built out to deep water above high tide, the mattresses hung under it by ropes, and the stone dropped on them from above to sink them. Instead of being launched from shore and towed, they were carried on a portable railway running on top of the trestle, and let down.

The Columbia River jetty is the most conspicuous example of the single instead of the double dike. It is $42\frac{1}{4}$ miles in length, the longest in the world. The bar at the mouth of the river, ever shifting and sometimes not over 12 feet deep, had half spoiled this superb river for navigation, and was greatly dreaded. But the river has a mean high-water discharge of 600,000 cubic feet per second, a mean tidal ebb of 1,000,000, with tides of 6.2 feet; and in 1884 a single curved line of brush mattresses with rubble-stone copings was begun, completed in 1894, to turn the current away from spreading itself on both sides and scour out the channel on one. This was finished in 1894; it has formed a permanent channel 30 feet deep, and made the river a highway of the heaviest ocean commerce, with lines to all Pacific lands.

Others are too numerous for more than brief mention. At Yaquina Bay, Oregon, 115 miles south of the Columbia—an estuary 20 miles long discharging into the sea through a narrow, tortuous, shifting channel, and over a sand-bar with 7 feet of water—parallel jetties about half a mile long, one of rubble-stone on a rock bed, one of brush and stone on a sand bed, have doubled the depth of water and made the channel calculable. At Galveston, the single jetty was a relative failure, it needing a double one to converge the tides; and in 1896 the government completed it, with sides of 35,000 and 25,000 feet, costing over \$8,000,000, and furnishing 27 feet of water between the island and the mainland. Other notable ones are at the mouth of St. John's River, Florida, beginning at the sides of the river-mouth and converging to 1,000 feet apart at the crest of the bar. Charleston's double one has sides of 15,000 feet each.

Jeune, LADY MARY STEWART-MACKENZIE, English writer on social topics. She is the wife of Sir Francis Jeune and has long been prominent in efforts to relieve the condition of the poor of London. A volume of essays selected from her contributions to periodicals has been published under the title 'Lesser Questions' (1894).

Jevons, William Stanley, English logician and economist: b. Liverpool 1 Sept. 1835; d. Bexhill, near Hastings, 13 Aug. 1882. He was graduated from University College, London. Having obtained an appointment in the Royal Mint, he went to New South Wales in 1854, but afterward returned to England, and in 1866 became professor of logic, philosophy and political economy in Owens College, Manchester, and this post he held until his resignation in 1876 in order to accept the chair of political economy in London University. He retired from this

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position in 1880 for the purpose of devoting his whole time to literary pursuits. His writings include: 'Pure Logic' (1864) and 'The Substitution of Similars' (1869), in which he sought to popularize symbolic logic through a modification of Boole's mathematical methods; 'Elementary Lessons in Logic' (1870); 'Theory of Political Economy' (1871); 'The Principles of Science' (1874); 'Money and the Mechanism of Exchange' (1875); 'Primer of Logic' (1876); 'Primer of Political Economy' (1878); 'Studies in Deductive Logic' (1880); and 'The State in Relation to Labour' (1882). Among works published posthumously are: 'Methods of Social Reform' (1883); 'Investigations in Currency and Finance' (1884); and 'Pure Logic' (1890). In a pamphlet on the 'Coal Question,' he presented a mass of evidence to show that England's progress would be checked by want of coal; in his work in political economy he attempted to put the chief definitions in the form of mathematical quantitative formulæ, and in this way did important work in revealing the nature and relations of economic facts; he also developed the theory of marginal utility. His 'Life and Letters' edited by his wife were published in 1886.

Jew, The Wandering, a poetical personage of popular traditions, who owes his existence to a story connected with the well-known scene in the history of Christ's passion. As Jesus was on the way to the place of execution, overcome with the weight of the cross, he wished to rest on a stone before the house of a Jew, whom the story calls Ahasuerus, who drove him away with curses. Jesus calmly replied, "Thou shalt wander on the earth till I return." The astonished Jew did not come to himself till the crowd had passed and the streets were empty. Driven by fear and remorse, he has since wandered, according to the command of the Lord, from place to place, and has never yet been able to find a grave. Shelley, Lewis, Croly, and Mrs. Norton in England, Schubart and Schlegel in Germany, and Sue in France, have turned this legend to account. Goethe has sketched Ahasuerus with great spirit and humor as a philosophic cobbler at Jerusalem who opposes Christ with a cold worldly logic which will not look above the things of earth.

Jew of Malta, The, a tragedy written by Marlowe (q.v.) about 1587, first acted 1592, and first published in 1633, edited by Heywood. Shakespeare was largely indebted to Marlowe's play for his 'Merchant of Venice.'

Jewel-weed, Touch-me-not, or Snap-weed, popular names for two plants, *Impatiens aurea* and *I. biflora*, of the natural order Geranaceæ, well known in damp shady places throughout the cooler parts of North America, where they form dense masses. They are characterized by sac-like pendulous yellow or orange, more or less spotted flowers, and by their sensitive seed pods which when mature burst with the slightest touch and throw the seeds to a considerable distance. Hence the second and third names above. The first name is probably a survival of their use as antidotes for so-called *Rhus* poisoning.

Jewell, joo'ēl, Marshall, American statesman: b. Winchester, N. H., 20 Oct. 1825; d. Hartford, Conn., 10 Feb. 1883. He learned the

tanning trade in his father's leather belting business; went West, where he was a telegraph operator for three years, and in 1850 returned and re-entered his father's business. In 1868 he was the unsuccessful Republican candidate for governor of Connecticut, but in 1869 he was elected, and re-elected in 1871. During his administration as governor the present militia system was adopted, and the erection of the new State House begun. In 1873 he was appointed United States minister to Russia, and was recalled to become postmaster-general in President Grant's cabinet in 1874. He resigned in 1876 on account of disagreement with the President's policy in the Whiskey Ring frauds. His work in the Post-office Department was very effective and led to the discovery of the Star Route scandal, and to the introduction of several reforms. In 1880 he was chairman of the Republican National Committee and managed the Garfield campaign.

Jew'ery, ornaments for personal adornment, usually made of gems and precious metals. At some remote period primitive man gradually migrated northward from the tropical belt in which he probably first came into existence, and as he felt the colder temperature inconvenient, especially at night, he found it advisable to invent some sort of covering or clothing, by means of which he could obtain warmth. What the first clothing was it is of course impossible to say, but it may be conjectured to have consisted of belts of grass or leaves knotted together either by their own stocks or by accessory vegetable fibres. When men became hunters, which they did not do until they had progressed far enough to have invented offensive weapons, they no doubt soon used dried skins for clothing. A rough tanning of such skins could have been managed by rubbing them with fat. Then came the difficulty of fastening them. Some savage tribes still wear cloaks which have only a hole cut for the head to go through, and this is likely enough to be a primitive type; then also they might have been tied up with strips of sinew, but at an early stage they were pinned together with a bone or large thorn. Here is the germ of the brooch. Numbers of such pins have been found in all places where the remains of primitive man exist, and they range from the simplest forms to quite ornamental ones. The heads of the carved specimens show a certain amount of progression, and are often decorated with engraved lines, dots, and circles. Ivory, wood, and bone are all commonly used, and in time, as metal workings became known, these carved pins are imitated in bronze or gold. From the Stone Age, through the Bronze Age, up to the Iron Age, in which we are still considered to be, pins and their derivatives, brooches and buckles, have been universally used, and it is an interesting study to endeavor to trace their utilitarian development as well as their artistic and technical beauties. Starting with the earliest metal pins, which are of bronze, it soon appears that the head or thickened end is treated ornamentally, hammered flat, and pierced. Into the pierced hole in the top of pins are often found wire rings coiled several times, or single rings, as in plenty of specimens found in Ireland. In other cases of Roman pins found in Britain, there are chains of which a few links

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only are left, and in one case at least a pin the head of which was threaded with a chain of several links, was found among the debris of one of the Swiss lake dwellings. The modern safety-pin is quite the same in all essential points as one which was found by Dr. Schliemann at Mycenæ, and the same form, with the arch more or less specialized in design, has been very largely used North and South, East and West. The Greeks made the arch short, and enlarged and ornamented the nose or hollow for the pin to rest in; the Romans made the arch big, and set it with beads of amber and bronze, and fretted it out in innumerable ways, curves, spirals, and all sorts of twists and turns which the fancy of the artist could devise. The Roman fibulæ are more usually made of bronze or silver, but the Greek are largely of gold, and of exquisite workmanship.

Among the Romans of about the Augustan age, cameos were largely used as pendants; coins also, richly set, were so used. Charlemagne, in the 8th century, wore a splendid reliquary as his necklace, which was sent to him by Haroun-al-Rashid. This was buried with him, and was found on his neck when the body was exhumed in 1169. The use of ornamental monograms in jewelry began during the 14th century. Diamonds used in jewelry before the beginning of the 17th century are always cut, either as "tables" or "roses," the "brilliant" not being then invented, and all colored stones were cut in the rounded form known as "ca-bochon."

A French jeweler, named Daniel Mignot, during the beginning of the 17th century, is supposed to have first set rows of jewels close together in consecutive order. This notion was, of course, very suitable for working the monograms then so prevalent, and it has been more or less used ever since. From the 16th century pearls were much in fashion, and pendants commonly have single pearls or groups of pearls dependent from them. Toward the end of the 17th century pendants are found made of gold only, but exquisitely pierced, chased, and engraved, and some specimens of Portuguese work are remarkable for delicacy of execution; these are sometimes set with very small diamonds. Sprays of leaves and flowers, and knots of ribbon, during the 17th century, are made in metal, and thickly set with crystals—paste or real jewels—particularly by Venetian, French, and Portuguese, followed at a safe distance by English workmen. The best of these are by Giles Légare, and in the 18th century his follower, Pierre Bourdon.

The jewelers of the beginning of the 18th century did not hesitate to mix gold and silver in their jewelry. Gold was commonly used for the settings of colored stones, and silver for diamonds. Summarized briefly: (1) Savage tribes have used for their ornaments natural objects easily worked. (2) The cultured nations of antiquity have generally made their finest pieces of personal ornament of gold. (3) During the period of the Renaissance gold and silver, colored precious stones, and vitreous enamels were very largely used. (4) During the 19th century the diamond particularly claimed the attention of jewelers. See DIAMOND; GEMS; PEARL, etc.

Jewelry Trade, The. The manufacture of jewelry in this country is one of the oldest industries of which there is tangible record, for to the native American Indian's love of personal adornment we trace the origin of jewelry in America. The Indian chiefs covered themselves with the best that the handiwork of their tribes could produce, and we are told that their wrists, ankles, heads, ears, and even noses, all bore tribute to their vanity and their love for adorning their persons with trinkets.

The history of the early Dutch settlers informs us that they brought with them such articles as they needed for their personal adornment in the new settlements; and in the English-speaking towns from the very foundation of the colonies no one's attire was considered complete without buckles, brooches, and rings made of the metals in vogue at that time. So the industry of gold and silver smithing was soon established, and in each of the three principal towns in the colonies there were numerous gold and silver smiths, whose principal products were medals and other trinkets for Indian chiefs, and snuff-boxes.

Another product of the early silversmiths much in evidence was elaborate boxes in which were enclosed the parchments conferring the freedom of the city upon distinguished guests. These boxes or receptacles were usually made of silver with a lining of gold, and frequently of gold studded with precious stones. After Andrew Hamilton defended the liberty of the press in New York in 1734 the corporation bestowed their citizenship upon him, enclosing the parchment conferring this in a very elaborate box; and later others were presented to Lafayette, Washington, and Scott. The making of ornamental insignia conferred upon distinguished men developed into an important feature of the goldsmith's work, and the craft received so many accessions to its ranks that in 1788, when the adoption of the Federal Constitution was celebrated in Philadelphia, 35 goldsmiths and jewelers turned out in the procession. More than 20 years before this the profusion of silverware, jewelry, and other evidences of wealth in a prominent New York residence, it is said, incited Townshend to introduce the historic bill known as the Stamp Act, the entering wedge by which the colonies were finally separated from the mother country. The colonies which had the richest inhabitants, and as a consequence those who spent most in personal adornment, were South Carolina, Virginia, Maryland, Pennsylvania, New York, and Massachusetts. The tools used in the earlier days were much like those used by workers in other metals at that time, except that they were smaller and better finished for finer work. The extreme tenuity and the lack of brittleness of gold and silver gave play to great ingenuity in varying ordinary patterns with fanciful designs, and the attaining of a polished or burnished surface made necessary a more tender treatment. In the earlier years of the century the frosting of gold and the satin finishing of silver were unknown arts, everything coming from the workshop with a glittering surface, most of the ornamental or decorative work being either crude enameling, applied work, or engraving. Later the precious metals were also used conjointly with other metals, wood, mother-of-pearl, glass, porcelain, pearls, and gems; but most of these attempts

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were ambitious efforts to realize the ideals formed from studying, in books and single engravings that from time to time found their way to this country, the illustrations of metal-work. However, nearly every one who engaged in the business at that time learned it thoroughly, in the old-fashioned way that embodied all branches of the trade, so that a hundred years ago it was impossible to draw a distinction between the occupation of jeweler and either goldsmith or silversmith, or between watchmaker and either clockmaker or maker of fine mathematical instruments — each of these branches involving the others. An artisan, though expert, rarely found sufficient work to employ all his time in any one department of his handiwork, and thus, from no matter of choice, but from compulsion, divided his time and skill between his own and kindred trades. The seller of these goods then was a workman rather than a dealer, and it was essential for him to have an intimate knowledge of all kinds of metal and fancy work. The more progressive of these artisans developed by degrees into manufacturers, beginning usually with one, two, or three articles in stock, such as spoons, forks, rings, and other small pieces; and later hollow silverware, tea-pots, etc.

Providence became early one of the centres of the trade; for the industry secured a footing in that city soon after the Revolution, when the manufacture of silverware was begun by Messrs. Sanders & Pitman and Cyril Dodge. In 1805 four establishments were located there. These belonged to Nehemiah Dodge, Ezekiel Burr, John C. Jenckes, and Pitman & Dorrance. Their products were chiefly silver spoons, gold beads, and finger-rings, and they employed in all about 30 men. Some of them soon branched out into cheap gold jewelry, silver and other alloys being largely used, with a very small fraction of gold, while large articles were plated by the hammering process. Breast-pins, ear-rings, sleeve-buttons, and key-rings, in addition to the articles mentioned, were among the early products at Providence. About the same time work was also begun at Attleboro, which town for many years held pre-eminence in the trade. In 1812 it was stated that there was then sufficient gold and silver ware manufactured to meet every demand in the United States. In Newark the business of manufacturing goods of this kind began early in the 19th century. The town was favorably situated for manufactures, and the men originally interested in the enterprise, Hinsdale & Taylor, combined industry with enterprise. Philadelphia was always very prominent as a manufacturing town, and a large trade, particularly with the South and West, sprang up there. Bailey & Company were one of the jewelry houses early established in that city, and the firm, under a different name, still exists. About 70 years ago Maiden Lane, of New York, became the great centre of the jewelry business in this country. With the improvements in manufacturing elsewhere, new ideas began to affect the trade. The fresh desire for novelties gave an impetus to the trade, and New York became the natural market for the introduction of every new product. In the New York 'Mercantile Register' of 1848-9, in the chapter devoted to manufacturers of silverware, watches, jewelry, etc., we find the advertisements of the following houses, in the order named: Ball, Tompkins & Black (late Marquand &

Company), 247 Broadway; Allcock & Allen, 341 Broadway; Gale & Hayden, 116 Fulton Street; Tiffany, Young & Ellis, 271 Broadway; Wood & Hughes, 142 Fulton Street; Samuel W. Benedict, 5 Wall Street; George C. Allen, 51 Wall Street; Squire & Brother, 92 Fulton Street and 182 Bowery; and others. Some of these houses have gone out of existence, one still retains its original firm name, and three are conducted under different firm names, which yet embody some part of the original title.

The great advance of American art is nowhere more pronounced than in the art metal-work of the gold and silver smiths, which has long since placed American products at the head of the art metal-work of the world. Because of this and our wider knowledge of articles into whose manufacture good taste enters as an important factor, it is not surprising that, relatively to the population, far more jewelry and silverware are demanded than formerly. The designers now employed by gold and silver smiths are men of liberal education, who can, if required, draw and model from life, and paint in oil or water-colors. Much work in ornamental gold and silver ware has been done in this country by such men within the past 50 years, notably in the way of loving-cups, vases, metallic designs, and presentation pieces. As conspicuous among these may be mentioned the gold medals, valued at \$1,000 and \$500, presented by the State of New York in 1858 to Dr. E. K. Kane and Commander H. S. Hartstein, the Arctic explorers; and the silver vase made in honor of William Cullen Bryant, now in the Metropolitan Museum of Art. The testimonials presented to Cyrus Field upon the completion of the Atlantic cable in 1866 include a gold medal struck for the occasion, a gold box, and many pieces of silverware. Other notable specimens are the silver services presented to the arbitrators of the Alabama claims in 1873; the silver centrepiece, "Liberty Enlightening the World," presented to August Bartholdi in 1886; the testimonial presented to William Ewart Gladstone in 1887; the loving-cup to Edwin Booth; and a great number of yachting trophies for international and other regattas. Many of these trophies annually made are of exceptional merit, and examples of art metal-work that cannot be duplicated or equaled in any other country.

The discovery of gold in California in 1848 and 1849 gave us a home supply of this metal, and gave employment to metallurgists and miners. The opening of the expositions in London and Paris revealed to us the forms of art and the increasing business of the manufacturing jewelers in this country, and made comparatively easy the acquirement of inventions in machinery and tools necessary to reduce the cost of products. Since 1860 all kinds of goods for which plating is employed have been largely prepared by electro-metallurgy, the centre of production being chiefly in Connecticut, there being also large plants at Newark, N. J., and Providence, R. I. This process is highly valuable, because it places within the reach of people of limited means attractive tableware and other articles of utility now deemed indispensable, which, if not as artistic and as highly finished as solid silverware, are serviceable, and in many instances possess exceptional merit. The production of silver-plated ware, although a great industry, has not retarded or encroached upon the demand for

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solid silver; in fact, many instances of recent date would indicate that, with the present low valuation of silver bullion and the mechanical improvements that have further reduced the cost of production, solid silver is rapidly increasing in popular favor and making serious inroads upon the sale of all small articles still manufactured in plated ware.

The production of watches is another American industry closely related to the jewelry trade. They are manufactured in a number of States, notably Massachusetts, Illinois, and New Jersey; the making of the watch-cases forms a separate industry, which thrives especially in Brooklyn and Philadelphia. The highest grades of watches, such as complicated chronographs, calendar and stop watches, and very small watches for ladies, are still imported from Switzerland. Until about 1850 precious gems and articles of virtu of high order were seldom sold in the United States. New York or Philadelphia jewelers acted merely as agents to obtain for patrons some desired articles from a European house. But now the objects of art and other accessories of a modern jeweler's stock represent many thousands of dollars, and include opera-glasses, Sévres ware, fine pottery, ceramics, enamels, glass, objects in rock-crystal, clocks, bronzes, marbles, plaques, antiquities, curios, and many costly pieces of bric-à-brac and cabinet ornaments that appeal chiefly to collectors and connoisseurs of art. In diamonds and precious stones America is in the front rank of nations as consumer, and New York is the largest market for gems and precious stones in the world. The art of diamond cutting and polishing, although established here for a number of years, recently, through the changes made in the tariff regulations, received such an impetus as to attract many diamond cutters from Holland to this country; and if further revisions are made in the tariff, admitting diamonds in the rough free of duty, it is not unlikely that the industry, which for generations has centred in Amsterdam and Rotterdam, will be centred before many years in New York, Brooklyn, and other cities of the United States.

In the matter of statistics the earliest figures that we have as to the production of jewelry are that in 1812 \$100,000 worth was produced in Providence. But as late as 1860 the returns were small. The jewelers and watchmakers of Philadelphia produced in that year \$691,430 worth; the silverware men, \$516,000; makers of gold watch-cases and chains, \$1,714,800. In New York the production was: of gold chains and jewelry, \$2,497,761; gold watch-cases, \$337,600; silverware, \$1,250,605. Newark made \$1,341,000 worth of jewelry; Providence, \$2,251,382 of jewelry, and \$490,000 in silverware. In 1890 taking the total production by cities, Providence was still first, and then, in order, are New York, Newark, Philadelphia, Brooklyn, San Francisco, Cincinnati, Boston, and Chicago. The bulk of the gold and silver products of Providence, Newark, and other eastern manufacturing centers is sold in New York.

The figures for 1880-1900 are as follows:

	1880	1890	1900
Establishments.....	739	783	908
Capital.....	\$11,431,164	\$22,246,508	\$28,120,939
Employees.....	12,697	13,880	20,676
Wages.....	\$ 6,441,688	\$ 8,038,327	\$10,746,375
Value of product....	\$22,201,621	\$34,761,458	\$46,501,181

These statistics, however, do not indicate what has been accomplished from an artistic standpoint. American jewelry and silverware have steadily advanced in the quality and the character of products as much as the mere quantity. When the industry was in its infancy we looked to London and Paris for ideas, designs, and models. But we no longer accept the models and ideas of our French and English cousins in the designing of our jewelry and silverware. Dealers no longer import foreign jewelry and silverware into this country, because American products are fully equal, and in most cases superior, to those of other countries, in both correctness and originality of designs and workmanship.

The success of 'American jewelry abroad is evidenced by the victories over its European competitors of a leading New York firm at the Paris expositions of 1878 and 1889, and the appointment of the same house by royal letters as jewelers, gold and silver smiths to the courts of England, Russia, Austria, Belgium, Italy, Denmark, Greece, Spain, Portugal, Rumania, Egypt, and Persia.

In conclusion, what additional progress has been made, and shown at the World's Columbian Exposition, and at later American "fairs," is of too recent date to present in detail in this article. Much has been written and printed upon the art metal display of the gold and silver smiths, publications at home and abroad for many months dwelling with lavish and minute detail upon the many extraordinary features of the exhibit, which the London "Art Journal" summarizes in an elaborate review, October 1893, as follows: "Judging by the productions exhibited, one may well be in doubt whether our much-boasted European pre-eminence in these things is to last much longer, and whether, after all, we shall not in the near future be compelled to regard the firms of New York as at least our equals, if not superiors, in the production of high-class gold and silver work."

CHARLES L. TIFFANY,
Tiffany & Co., New York.

Jewett, joo'ët, Milo Parker, American educator: b. Saint Johnsbury, Vt., 27 April 1808; d. Milwaukee, Wis., 9 June 1882. He was graduated from Dartmouth College in 1828, from the Andover Theological Seminary in 1833, and was professor of rhetoric and political economy in Marietta College (Ohio) in 1833-8. Having become a Baptist, he resigned his professorship, in 1839-55 was principal of the Judson female institute established by him in Marion, Ala., and at the same time edited the 'Alabama Baptist.' He then established a young ladies' seminary at Poughkeepsie, N. Y., assisted Matthew Vassar (q.v.) in founding Vassar College, was its first president in 1862-4, and subsequently was active in educational and religious work at Milwaukee, Wis. Among his writings are a treatise on 'Baptism' (1840), and pamphlets on 'The Relations of Boards of Health and Intemperance' (1874) and 'The Model Academy' (1875).

Jewett, Sarah Orne, American novelist and writer of short stories: b. South Berwick, Maine, 3 Sept. 1849. She was educated at Berwick Academy and became a contributor to the 'Atlantic Monthly' in 1869, in which periodical the larger part of her work has appeared. Her usual theme is the New England character seen

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from its most attractive side, its gentler aspects given greater prominence, and its harsher ones not unduly emphasized. Her works include: 'Deephaven' (1877); 'Play Days' (1878); 'Old Friends and New' (1879); 'Country By-Ways' (1881); 'The Mate of the Daylight, and Friends Ashore' (1883); 'A Country Doctor,' a novel (1884); 'A Marsh Island,' a novel (1885); 'A White Heron and Other Stories' (1886); 'The Story of the Normans,' an historical work (1887); 'The King of Folly Island, and Other People' (1888); 'Betty Leicester' (1889); 'Strangers and Wayfarers' (1890); 'A Native of Winby, and Other Tales' (1893); 'The Life of Nancy' (1895); 'The Country of the Pointed Firs' (1896); 'The Queen's Twin and Other Stories' (1899); 'Betty Leicester's Christmas' (1899); etc. Her literary style possesses great charm.

Jewfish, a huge Californian game-fish (*Stereolepis gigas*) of the sea-bass family (*Serranidae*). It has a single dorsal fin, the soft part of which is shorter than the spinous portion, and is brown with black blotches and becomes much darker with age. Among the dense growths of kelp in moderately deep water along the coast of southern California the jewfish finds a congenial home. It haunts the neighborhood of islands and is especially abundant about Santa Catalina. Belonging to a family of game-fishes and reaching a weight of 300 to 500 pounds, it has long been a favorite object of sport for ambitious anglers. It is commonly taken on hand-lines baited with small fish, is exceedingly gamy, and brings a good price in the market.

Two other fishes of the same family but more closely related to the groupers are known as the Florida or black jewfish (*Garrupa nigra*) and the spotted jewfish (*Promicrops guttatus*). The former ranges from Florida to Brazil, and the latter widely through the warm parts of both Atlantic and Pacific oceans. The black jewfish is quite common about the coral reefs, in the caverns of which it lurks. Although not especially gamy, its enormous size and weight, sometimes reaching even 1,000 pounds, have induced a few anglers to essay its capture with rod and reel. It is easily distinguished from the Californian jewfish by its greater robustness, strong canine teeth, and rounded caudal fin. Consult Jordan and Evermann, 'American Food and Game Fishes' (1903); Holder, 'Big Game Fishes of the United States.'

Jewish Calendar. The Jews date their era from the Creation, which according to their tradition was 3760-1 years before the Christian era. The Jewish year is a lunar year and consists of twelve months, with an additional one for leap year. The months have alternately 29 and 30 days, the first and thirtieth days being called New-moon. Each cycle of 19 years has 7 leap years, the 3d, 6th, 8th, 11th, 14th, 17th, and 19th. The spring months are called Nisan (in which the Passover is celebrated), Iyar, Sivan; summer includes Tammuz, Ab, Elul; autumn Tishri, Heshvan, Kislev; and winter Tebeth, Shebat, Adar, with 2d Adar for leap year. The civil year began with the month of Nisan; the religious with Tishri. Rules for the computation of the calendar were issued, after various meth-

ods had been employed in earlier centuries, by Hillel II. (330-365). The date usually assigned by Jewish writers to the year when Hillel fixed the calendar is 670 of the Seleucidan era, or 4119 A.M., or 359 of the Christian era.

Jewish Charities. On 26 April 1655, the board of directors of the Dutch West India Company wrote to Governor Stuyvesant as follows: "After many consultations, we have decided and resolved upon a certain petition made by said Portuguese Jews, that they shall have permission to sell and to trade in New Netherland and to live and remain there, provided the poor among them shall not become a burden to the company, or to the community, but be supported by their own nation."

The records of the Department of Charities of the city of New York on 31 Dec. 1902 show that in a Jewish population approximating 600,000 in Greater New York, in the almshouse on Blackwell's Island there were 17 pauper Jews, of whom the majority were blind, idiotic or possessed of some peculiar defect which prevented admission to existing Jewish charitable institutions. These figures indicate how thoroughly the Jews of New York have assumed the responsibility imposed upon them over 250 years ago. The same is true of Jews throughout the United States. In our modern day, under more favorable conditions and auspices, the Jew has, to some extent, become non-sectarian in his philanthropies. Hospitals, as a rule, supported and endowed by Jews, throw open their doors to sufferers irrespective of creed, color or nationality. Other instances could be cited of charities not medical, organized along similar lines. The free employment bureau of the United Hebrew Charities of New York makes no distinction with its applicants. The Educational Alliance in the same city offers its clubs and classes to Jew and Gentile alike. Jewish agencies, giving material relief, or to use a better term, those which care for the needy in their own homes, in the main confine their work to beneficiaries of their faith, without, however, making any rigid distinction. On the other hand, the trend of Jewish charity has been in the direction of caring for the Jewish poor, solely through Jewish agencies, and without the intervention or co-operation of other sectarian or non-sectarian societies or institutions.

The problem of the Jewish charitable societies of the United States to-day is the problem of the care of the immigrant. As such, it passes beyond merely local lines. In some of its manifestations it is national in character and in a few it has an international significance. The fact that the large bulk of the needy Jews in the United States reside in New York is accidental, and concerns the Jews of Denver and San Francisco equally with those of the eastern seaboard cities. In so far the problem is a national one. Moreover, to deal intelligently with the question requires a knowledge of the immigrant's antecedents, the impelling motive which brought him to the United States, and an acquaintance with his previous environment. And here the international phase of the question comes in. Roughly speaking, it may be said that there are no American-born Jewish poor. Of the 10,924 families who applied for assistance to the United Hebrew Charities of New York during the year ending 30 Sept. 1903, 2 per cent

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were born in the United States. And of these the majority of heads of families were of the first generation. Jewish dependents who have an ancestry in the United States of more than two generations are practically unknown.

In the year 1881 began that great wave of emigration from eastern Europe, the end of which is not yet. Driven by a relentless persecution, which endangered not only their homes but frequently their lives, thousands of Jews were compelled to flee from their homes to seek new residence on these shores. The Russo-Jewish committee which originally undertook the work of caring for these immigrants turned it over very shortly to the Hebrew Emigrant Aid Society, which came into existence in December 1881. In one year this society spent \$250,000, \$50,000 less than had been spent by the United Hebrew Charities of New York in the seven years of its existence. In the first and only annual report of the Emigrant Aid Society, its president outlined as tersely as possible the efforts that had been made to provide homes and occupations for the thousands of fleeing exiles who reached these shores during the momentous summer of 1882. In the month of July the committee spent for board and lodging alone over \$11,700.

With the gradual falling off in immigration, the Emigrant Aid Society went out of existence, and the care of the needy immigrant who remained in New York and who became impoverished after residence, reverted to the United Hebrew Charities. In 1885 immigration again began to grow heavier and continued to grow in such numbers that in the following five years over 120,000 immigrants arrived at Castle Garden. In 1890 the immigration reached the figures of 32,321, the largest number ever recorded up to that time. With all that had been done, the real work of the charities was but to begin. In 1891 the religious persecution of the Russian Jews reached a climax. In the year ending 30 September 62,574 immigrants arrived at New York, of whom nearly 40,000 arrived between June and September. The entire charitable effort of the New York Jewish community was for the time directed out of the ordinary channels and applied to this monumental question of caring for the arriving Russian Jews. The Baron de Hirsch Fund, instead of utilizing its income for its educational work, appropriated over \$67,000 to the United Hebrew Charities to assist in the work of the immigration bureau. Over \$175,000 was spent by the United Hebrew Charities during this year. In September of 1891 it became apparent that there would be no cessation to the immigration, and that much larger funds would be necessary to give anything like adequate assistance to the unfortunates who were arriving at the rate of 2,000 per week. The enthusiasm which was aroused at a banquet tendered to the late Jesse Seligman brought into existence the "Russian Transportation Fund," which added over \$90,000 to the revenues of the United Hebrew Charities and which was given by citizens of New York, irrespective of creed. Later in the year, a standing committee of the society, known as the Central Russian Refugees Committee, was organized and was made up of representatives of the Baron de Hirsch Fund, the Russian Transportation Fund, the United Hebrew Charities and the American Committee for Ameliorating

the Condition of the Russian Exiles. The last committee was organized to secure the co-operation of relief societies in other cities, in order that the various European societies who were assisting the persecuted Russians to emigrate should thoroughly understand the attitude of the New York organization. The year, October 1891 to September 1892, will ever be a memorable one in the history of Russian emigration and of Jewish philanthropy; 52,134 immigrants arrived at the Barge office in that time. The treasurer of the United Hebrew Charities paid out the enormous sum of \$321,311.05, of which \$145,200 was spent by the Russian Refugees Committee between February and September.

Since the year 1881, fully 600,000 Jewish immigrants have arrived at the port of New York alone. Of these the bulk comprise refugees from Russian and Rumanian persecution, Austrians and Galicians. They came from countries in which many of them lived under conditions of appalling poverty. The records of the immigration bureau show that from the standpoint of material wealth, these immigrants are below the average of immigrants from other European countries. Due to their previous condition, a goodly percentage is illiterate. On the other hand, the number of skilled artisans and craftsmen is so large as to be distinctly noticeable. From the standpoint of dependency, it will be of interest to study to what extent this large body of immigrants has added to the dependent and delinquent classes of the communities in the United States. The only figures that are at hand are those of New York, which are higher than would be found in other cities and towns for reasons that are obvious.

In December 1899 a study was made of 1,000 families who had originally applied to the United Hebrew Charities for assistance in October 1894. Of these 1,000 applicants it was found that 602 had not applied for assistance after December 1894. Of the balance, 67 families were dependent on the society to a greater or lesser extent in January 1899. More detailed investigation disclosed the fact that nearly all of these 67 applicants were made up of families where the wage-earner had died, leaving a widow with small children, or of respectable aged and infirm couples unable to be fully self-supporting, or of families in which the wage-earner had become incapacitated through illness. In other words, after five years over 93 per cent of the cases studied were independent of charitable interference. The marked feature in the care of the Jewish poor in the United States is the almost entire absence of the so-called pauper element. Even the 67 families above mentioned cannot be included in this category. Widowhood is the resultant of purely natural conditions, and when it afflicts the poor mother with a family, it frequently produces a condition of dependence which has in it no characteristics of demoralization.

If there is one cause more than another leading up to this condition, it is the absence of the drink evil among Jews. The instances in which drunkenness lies at the bottom of Jewish dependency are so infrequent that they may be ignored. Combined with the absence of this vice, there are other virtues engrained on the Jew for centuries, all of which tend to the preservation of his self-respect and his self-esteem. Among these are the love of home,

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the inherent desire to preserve the purity of the family, and the remarkable eagerness which he shows for education and self-improvement.

From what has preceded, it will be comprehensible that the Jewish charities of the United States, having a special problem with which to deal, have instituted special methods for its solution. In the main, relief organizations have followed the organized methods of sister societies. In the past 25 years, new organizations of all kinds have sprung into existence to meet the demands made by the constantly increased immigration. To revert to New York, when the Central Russian Refugees Committee went out of existence in January 1893, the decrease in immigration no longer warranting its continuance, the active work of assisting the arriving immigrants devolved upon the United Hebrew Charities. The work of this society is typical of similar Jewish organizations throughout the United States. The report of the fiscal year ending 30 Sept. 1903, shows that 10,924 individuals and families applied for assistance. Of these, 6,260 had applied for the first time. Material relief was granted to 7,200; 1,802 were found not to require assistance of this kind, and 1,202 were refused assistance for some cause or other. The society conducts an employment bureau which is free to employer and employee, and during the last fiscal year found employment for 3,892 applicants. It grants relief in kind, including groceries, clothing, shoes, furniture, etc. The extent of the society's work in this direction will be gathered from the statement that 51,875 garments and pieces of furniture were distributed last year. The annual disbursements for material relief alone amount to over \$150,000 per annum. Ever since its organization 30 years ago, the society has endeavored to uphold the principles of organized charity. In some instances it has antedated the charity organization societies themselves; as in the giving of relief in amounts adequate to make the recipient independent of further intervention on the part of the relief-giving agency, and the establishment of a graded, carefully regulated and supervised system of pensions covering if necessary a long period of years. As a rule, these pensions are given only to families where the wage-earner has died, and where, unless such provision were made, no recourse would be left, except the breaking up of the family and the commitment of the children to orphanages and similar institutions. To obviate the necessity of such commitment, the United Hebrew Charities disburses annually over \$35,000 in pensions. In the history of the society there is no form of relief which shows such good returns for the investment made. Families so supported do not become pauperized, since the subsidy which is granted enables the surviving parent to devote her time to the proper rearing of her children so that they may become useful and intelligent citizens.

Along the lines of making families self-supporting the United Hebrew Charities frequently grants assistance, presumably as a loan, in amounts varying from \$50 to \$250. These loans are made in special cases where it is not possible to make the applicant self-supporting through the ordinary channels of employment, etc. A wage-earner who has been incapacitated through illness or injury and hence unable to follow any routine work, may still be estab-

lished in some small business venture and be able to support his family. Thousands of dollars have been spent by the United Hebrew Charities along these lines with the most gratifying results—not only have beneficiaries become independent of the society, but many of them have managed to repay the loans made to them. Of all the problems which confront the average charity organization, possibly the most perplexing is the one of the family in which the mother must be the wage-earner. The kindergarten and the day nursery have by no means solved the problem. They are at best but makeshifts in an attempt to solve a situation which has its root in economic and industrial conditions. Again, the factory removes the mother from her sphere of influence over her children, and opens up opportunity for the growth of incorrigibility and waywardness on the part of the latter. In the hope of partially overcoming this difficulty, the United Hebrew Charities has for some years conducted a work-room for unskilled women in which the latter are taught various needle industries, in the hope that they may eventually be sufficiently accomplished to work in their own homes, and in this fashion supplement the family income. The amount of such work that can be found is limited. More and more, daily, the factory is competing with home industry to the exclusion of the latter. A study made by the society in 1902 showed that work could be obtained for women to do at home in industries such as silk-belt making, men's and women's neckwear, garters and hose supporters, paper boxes, slip covers for the furniture trade, over-gaiters and leggings, dressing sacques, hats and caps, flowers and feathers, beaded purses and other beadwork, dress shields, incandescent light mantles, embroidery and art embroidery, passementerie work, bibs, knit goods, etc. In the society's work-room the effort has been made to teach such industries to unskilled women, so as to enable them to become at least partially self-supporting.

It is needless to state that in a system as comprehensive as the United Hebrew Charities desires to be, provision has been made to alleviate distress in all its forms. Under the plan of dividing the city into districts, immediate relief can be given to emergency cases. These districts are in charge of co-operating societies known as Sisterhoods, who are responsible for the condition of the poor who have been placed in their care. Each of these agencies is practically a miniature United Hebrew Charities. Not only have they organized centres for the distribution of material relief, but along the lines of a more progressive philanthropy, the sisterhoods have developed day nurseries, kindergartens, clubs and classes of various kinds, employment bureaus, mothers' meetings, and in fact have become a social centre for the poor of their neighborhoods. Since a large percentage of the distress which is met with is occasioned by illness, medical relief of all kinds has been organized. Each district as a rule has its physician and its nurse, and where these are not at hand, co-operation has been effected with other organizations specially equipped for such work.

In very recent years, the spread of tuberculosis among Jews has merited the earnest attention of the society, and among its other activities it has been a pioneer in developing a

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systematic plan for caring for such tuberculous applicants in their own homes, for whom no provision could be made in existing sanatoria. The campaign thus begun has been not only a charitable, but a social one. Not only have these unfortunates been given food, nourishment and medical care to aid them toward recovery, but in addition thereto, instruction has been given them in the rudiments of sanitation, and in the prevention of infection. It is significant that the work of the United Hebrew Charities in this field has been followed to some extent by the recently organized Committee on Tuberculosis of the Charity Organization Society.

The name "United Hebrew Charities" as applied to the New York organization is somewhat of a misnomer, since it does not include all Jewish charitable agencies in the city of New York. It would be more proper to speak of it as the consolidation of all the purely relief societies which existed in New York prior to 1874. Aside from these, there are to-day hospitals, orphanages, technical schools for boys and girls, trade schools, day nurseries and kindergartens, guilds for crippled children, burial societies, loan societies, societies for maternity relief, and a goodly number of smaller organizations which have been founded by the immigrants of the last twenty years. Among the most important large organizations and institutions in New York may be mentioned: The Mount Sinai Hospital, Lebanon Hospital, Beth Israel Hospital, Montefiore Home, Hebrew Orphan Asylum, Hebrew Sheltering Guardian Society, Hebrew Infant Asylum, and Hebrew Free Loan Association. It is estimated that there are over 1,000 Jewish organizations and societies in the city of New York to-day, whose activities to a greater or lesser extent are directed along philanthropic lines. Practically all of the larger organizations, such as the hospitals, etc., work in co-operation with the United Hebrew Charities. In some of the other cities in the United States, where the question of the care of the poor is not so complex as in New York, closer co-operation has gone by leaps and bounds. In cities like Philadelphia, Cincinnati, Chicago, Cleveland, and others, the individual societies have formed federations of charities, the purpose of the federation being to express the philanthropic impulse of the community in terms of greatest economy, the smallest amount of friction and the highest possible efficiency. In Philadelphia the federation is the common treasury. It acts as the common collection agency of all moneys and distributes them pro-rata among the various societies and institutions whose autonomy is not impaired by this method. In other cities, this plan with some slight variations is in force. In New York sporadic attempts to form a federation have been unsuccessful owing to the immensity of the problem. There are indications at present that federation may become a possibility in the near future.

In addition to these local federations, the various societies throughout the United States have joined together to form a national body known as the National Conference of Jewish Charities. At present it comprises the relief organizations of 53 cities. Two biennial conferences have been held and the third will be held in the city of New York in May 1904. The published reports of these meetings indicate con-

clusively the wisdom and the necessity of founding such a national organization. The rules governing the transportation of dependents which have been in force in the National Conference of Jewish Charities since its inception were adopted with alterations and additions at the last meeting of the National Conference of Charities and Correction at its meeting in Atlanta in May 1903. At the meeting of the National Conference of Jewish Charities held in Detroit in May of the same year, the writer introduced a resolution advocating the establishment of a central bureau for the placing out and boarding out of dependent Jewish children in private homes. At that time the work of devising such a plan was delegated to the Independent Order B'nai B'rith, a fraternal Jewish order, which at present has the entire subject under discussion, and has drafted a plan which has been submitted to the various Jewish societies and institutions throughout the country. In New York city, under local auspices a similar movement has been inaugurated. Since July 1903, at which time work was begun, applications have been received for children from 84 Jewish families. Sixteen children have been placed in boarding homes and four in free homes.

Some idea of the extent to which Jewish charities have been developed in the United States may be gathered from the following: In practically every city and town there are benevolent societies which look after the interests of the poor in their midst. Jewish orphan asylums are established in the cities of Atlanta, Baltimore, Boston, Brooklyn, Chicago, Cincinnati, Cleveland, Newark, New Orleans, New York, Philadelphia, Pittsburg, Rochester, and San Francisco. In New York there are three institutions and in Philadelphia there are two. New York has four Jewish hospitals and Philadelphia has two. Baltimore, Chicago, Cincinnati, Denver, New Orleans, and San Francisco have each one. Homes for the aged and infirm are found in most of the large cities. Similarly, educational movements along philanthropic lines are developing throughout the country. These include organizations such as the Hebrew Educational Society of Brooklyn, the Hebrew Education Society of Philadelphia, the Jewish Training School of Chicago, the Hebrew Free and Industrial School Society of Saint Louis, the Hebrew Industrial School of Boston, the Clara de Hirsch Home for Working Girls, the Hebrew Technical School for Girls, the Hebrew Technical Institute and the Baron de Hirsch Trade School, the last four being situated in the city of New York. The Maxwell Street Settlement of Chicago and the Neighborhood House in Saint Paul are under Jewish auspices. Cincinnati, Milwaukee, and Cleveland have Jewish settlements. In New York the Educational Alliance, the largest institution of its kind in the United States, has within the past few years developed a settlement with resident workers. Along educational lines, the Jewish Chautauqua Society, a national organization, has for the past two years conducted a summer school in philanthropy in connection with its summer assembly held in Atlantic City, N. J. At these sessions, important communal problems of interest to Jewish workers in philanthropy have been considered.

Other national organizations of importance are the Jewish Agriculturalists' Aid Society, the

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Baron de Hirsch Fund, and the Jewish Agricultural and Industrial Aid Society. The first named, with headquarters in Chicago, is engaged in placing farmers throughout the Northwest, particularly in Dakota. The work of this society while not on an extended scale, has nevertheless given results and has demonstrated the fact that it is possible to take residents of congested centres, remove them to country districts, and make farmers of them. The Baron de Hirsch Fund was established under a foundation of the late Baron de Hirsch, the deed of trust being incorporated in March 1890. Its activities at present are directed to the conduct of the Baron de Hirsch Trade School in New York city and the Agricultural Colony at Woodbine, N. J., where the Fund has an Agricultural and Industrial School. The Fund likewise gives money to co-operating societies in various cities for the purpose of granting tools and teaching trades to recently arrived immigrants. The Jewish Agricultural and Industrial Aid Society is an off-shoot of the Baron de Hirsch Fund, receiving money from the latter society and from the Jewish Colonization Society, which was created under a de Hirsch endowment. Its purpose is to find agricultural and industrial positions for Jewish immigrants. Under the care of this organization are the various colonies in south Jersey, aside from Woodbine, and the organization has made farm loans to farmers in various parts of the United States, particularly in Connecticut. Probably the most important phase of this organization's work is the attempt to remove residents of the congested centres of large cities to places throughout the United States, where work has previously been found for them. In the first year the organization sent away 1,800 persons. In the second year 3,200 persons. During its present fiscal year, beginning 1 Jan. 1903, it has sent out 5,190 individuals, and its work is constantly increasing. The plan of the society is to find industrial positions anywhere in the United States, and having found them, to obtain individuals able to fill them from New York and other large cities like Philadelphia, Chicago, and Boston. In order to carry on the work as effectively as possible, the society cooperates with the Independent Order B'nai B'rith, which has lodges distributed throughout many of the smaller towns and communities in the United States, and with the benevolent organizations and societies represented in the National Conference of Jewish Charities. It has an office in New York city known as the Industrial Removal office, which is the centre of the activities of the society. From here all applicants who desire to leave the city are sent away, provided with the necessary transportation and with the guarantee that provision will be made for them at their destination until such time as they become full-fledged wage-earners. Should conditions require it, it is not uncommon for the society to send the wage-earner in advance and to make provision for the care of the family remaining here through the United Hebrew Charities. As soon as the society hears from its correspondent that the wage-earner is in a position to care for his family the latter is sent on and a reunion of the family accomplished.

On the literary side of Jewish philanthropy, it is interesting to note that the United Hebrew Charities of New York city is publishing a monthly magazine, 'Jewish Charity,' which is

devoted to the consideration of all topics of interest to workers in Jewish philanthropic fields.

LEE K. FRANKEL,
United Hebrew Charities, New York City.

Jewish Chautauqua, founded in 1893 by Rev. Dr. Henry Berkowitz of Philadelphia, and incorporated in 1899, with a body of officers representing the chief cities in the United States. This society has about 3,000 members, divided into various sections. Its courses include preparatory, two years, with readings in Jewish history and literature; Bible, four years; and special courses in post Biblical history and literature, 'Jewish Characters in English Fiction,' 'Beginners and Advanced Hebrew.' Its chief work of late years has been embodied in its summer assembly, at Atlantic City, N. J., which is held annually in July and lasts three weeks. It includes a summer school, popular lectures and conferences, literary and social entertainments, in which many prominent speakers participate. During the session of 1903 the condition of religious schools, dependent and delinquent children, how to relieve congestion in large cities, the status of the Jews of Russia, the attitude of Jewish university students toward Jewish problems, were the topics discussed. The average attendance at the morning sessions was from 150 to 350 persons and at the evening from 300 to 800 persons. During the summer of 1903 an English organization on the plan of the Jewish Chautauqua was formed at Ramsgate.

Jewish Exchequer, a special division of the Court of Exchequer of England (1200-90) which dealt with lawsuits between Jew and Christian, chiefly in reference to debts due the former, and recorded the taxes imposed on the Jews. The fact that it was found necessary to have a centre for Jewish business indicates the prominence in trade and finance of the Jews in England from the reign of Henry II. to the period of their expulsion (1290). The court did not long survive their departure. Many important data from its records have been jointly published by the Selden Society and the Jewish Historical Society of England.

Jewish Fraternities. While societies for mutual benefit exist in large numbers among the Jews in every land, in the United States, the fraternities or orders have acquired special popularity, and promote not alone Jewish solidarity but aid in maintaining many charitable institutions. These organizations as a class give pecuniary benefits in case of illness, and death-endowments, which latter insurance feature is now being made optional. The oldest and most influential is the Order of Benai Berith ("Sons of the Covenant"), formed 60 years ago, and having a membership of 30,000. Its 315 lodges extend over the entire country, and it has 13 lodges in Algeria, Bulgaria, Egypt, Turkey, and Palestine, 42 in Germany, 16 in Rumania, and 10 in Austria. It supports orphan asylums in Cleveland, Ohio, Atlanta, Ga., San Francisco, Cal., a home for the aged at Yonkers, N. Y., a free library in New York, while it co-operates with an orphan home in New Orleans, a technical school in Philadelphia, and a hospital for consumptives in Denver, Colo. The next leading order is the Free Sons of Israel, founded in 1849, with 103 lodges and 11,000 members. The Free Sons of Benjamin (1879) has 192 lodges; 14,088 male and 1,361

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female members. The Berith Abraham (1859) has 288 lodges and 42,000 members. The I. O. Berith Abraham, with 302 lodges and 56,949 members, was founded in 1887. The Ahavas Israel Order (1890) counts 124 lodges. In addition there are seven other fraternities which have been recently started. The Order of Kesher Shel Barzel, founded a home for the aged at Cleve-land. Special efforts are now being made by the Benai Berith to institute lodges among the Russian and Rumanian immigrants, and the project of establishing a Jewish University of the highest rank has been brought to its attention.

A. S. ISAACS,

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Jewish Sects. To the fact that Judaism has never been a sluggish stream, but was ever in active movement, we owe the existence of sects among the Jews. The right of liberty of thought was always exercised, and to the conflict of opinion the survival of Judaism is largely due. Apart from the individualism which is a marked element in Jewish character, the influence of surroundings has had a formative effect, and the rise of sects in the nations among which he lived accustomed the Israelite to the spectacle of sects in his own community, due usually to the interpretation of text or ceremony, or to the initiative of some resolute leader. The history of Jewish sects displays the same bitterness and hostility that characterize sectarian feuds in general, although since the dispersion there has been more rattle than fang in the conflict between schools and parties in Jewry. The synagogue has never proclaimed any dogma of infallibility, and the rabbi was never regarded as absolute authority over conscience and soul. Climate, temperament, and environment were often the determining factors in precipitating the conflict which was waged, not by fierce encounters on the bloody field, but by debate in the schools and in polemical treatises that aroused partisan outcry and led to peaceful secession within the fold. Judaism and the law were never at stake—it was only the interpretation of one body of teachers or individual opinion which had to shift its ground.

Samaritans.—A brief summary of Jewish sects may best begin with the oldest of all. The Samaritans, termed in the Talmud (q.v.) "Cuthim," are traced to the mixed multitude who were made to settle in Samaria on the fall of the kingdom of Israel. The religion of the new colonists was a blending of Mosaism and heathenism, which led to a gradual separation from the Jewish body. They took no part in the revived commonwealth under Ezra and Nehemiah, but formed their own community, with their own temple, which was destroyed about 120 B.C. by John Hyrcanus I. (q.v.). The Samaritans gradually lost whatever prestige they had claimed. They now exist as a small sect, with constantly dwindling numbers, at Nablus (the Arabic form of Neapolis, the name given to Shechem under Vespasian). Here perhaps 100 survivors follow their traditional rites, and sacrifice as of old on Gerizim. The Samaritans now possess interest only from an archaeological point of view, although their ritual and literature have value for students of the Bible and of post-Biblical history.

Pharisees.—This party, often misunderstood and maligned, and which has had the ill-fortune

(similar to that of the Jesuits, for example), of supplying the term "pharisaic," in the sense of hypocritical, was the great popular party in Judea, including the representative leaders and men of learning in the Asmonæan era, who strove to maintain the traditional faith and ceremonies at all hazards and despite political entanglements. It is the opinion of Graetz, the best-known Jewish historian, that, deriving their name from *Perushim*, "the explainers" (of Scripture), they formed the learned body of the nation, and can only be called a party by way of distinction from the Sadducees and the Essenes. The Pharisees were the religious enthusiasts of their day, loyal to every traditional observance, naturally with the defects of their virtues when such rigid adherence became formalism. But it is faulty generalization to stigmatize all Pharisees as hypocrites because some were insincere, as occurs in the history of every creed.

Sadducees.—This sect, probably named from one of their leaders, Sadok, constituted the party of wealth and political power, who made the law subordinate to the exigencies of the national life, and to whom the traditions of their religion were secondary when the independence of the nation was to be upheld. Hence the differences in interpretation of the law, which led to violent feuds and internece conflict at a critical era when union might have checked the advancing Roman legions.

Essenes.—Sprung from the Assideans of the early Maccabæan days, resembling in some respects the Nazarites, the Essenes were rigid separatists from contamination, large numbers of whom were ascetics, favoring celibacy and forming a kind of religious brotherhood whose relation to early Christian practices, like baptism, is a suggestive topic for study. They were mystics, too, the logical forerunners of the sect of Chasidim, which was to acquire more notoriety than good repute in later centuries. The Essenes exercised no political influence. It was reserved for the Pharisee and the Sadducee to employ intrigue, hatred, and bloodshed against each other until Jerusalem fell.

Karaïtes.—About the middle of the 8th century this important sect arose among the Jews in Moslem lands. Their name means "readers," and they were followers of the Old Testament, but not the Talmud or rabbinical interpretations. Just as a sect in Islam rejected the traditional ruling, so almost contemporaneously a sect in Jewry abandoned rabbinical tradition. The leader in the movement was Anan ben David, a native of Babylon, who, chagrined at his failure to become an ecclesiastical dignitary, resolved to organize a revolt against tradition. For a time the movement made headway, but it never gained many adherents, and to-day exists in remnants only in Jerusalem and parts of Turkey, in Egypt, Galicia, and the Crimea. The Karaïtes, however, contributed largely to the study of the Old Testament, for the conflict between the Talmudists and their opponents led to closer and more accurate inquiry, and Scriptural investigation was followed with scientific thoroughness. The Karaïtes were keen disputants, and their polemical onslaughts on the Talmudists furnish a piquant phase in the history of Jewish thought. They failed, however, in their protest, and no reformation resulted. It is of interest to note that to-day in Russia the Karaïtes receive special consideration from the government, and

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apparently are not subjected to all the harsh exactions under which the rabbinical Jews suffer. Their very limited numbers, however, may account for the toleration.

Sabbatians.—In the 17th century a remarkable sect arose among the Jews, the followers of Sabbathai Zebi (1626-76), who was born in Smyrna, went to Jerusalem in 1664, and there proclaimed himself the Messiah and predicted his approaching rule over the universe, with his headquarters in Jerusalem, restored and made glorious. The news spread rapidly and produced profound excitement in Turkey and elsewhere. It was a century of gloom and anxiety for the Israelite, the era of Jewish massacres in the Ukraine, and with the greater avidity he turned to hopes of a revived nationality; many in sober European lands began to prepare for the journey eastward. Such Zionist dreams are of frequent recurrence, and numerous have been the false Messiahs in Jewish history. Sabbathai's career, however, was to receive a sudden check: the Sultan of Turkey, Mahomet IV., disliking popular excitement, imprisoned the prophet when he visited Constantinople, and after two months' confinement his pretensions faded away. He made a tame confession of his dishonesty and became a convert to Islam when the Sultan suggested the step. Many of his adherents in Turkey, Poland, Italy, Austria, Holland, and Germany were not discouraged by his conversion, but still believed in his Messiahship. In 1668 on the Passover he declared that he had received revelations from the Holy Ghost and was permitted by the Turks to preach in the synagogues. A sect of Sabbatians was gradually formed, with special doctrines and rites of their own, gradually dissolving into minor bodies of no influence. The Sabbatians in Turkey adopted Islam in 1687, with Sabbathai's successor, his brother-in-law Jacob Querido, at their head. On his death, his son became their Messiah (1695-1740). This Jewish-Turkish sect still exists and numbers about 4,000 adherents. Sabbathai's followers in Poland fell into crass mysticism, with harmful influences on Jewish development. In Italy they soon ran their course, and in Holland and Germany they were unmasked and sought flight.

Frankists.—These were a sect named after their founder, Jacob Leibovitz Frank, born in Podolia about 1726, died at Offenbach 1791, who was one of the apostles of Sabbathai Zebi. His vagaries were as pronounced as those of his master. Ultimately, after heated disputes with the rabbinical Jews, he abolished the law, and his sect became Catholic and was absorbed by the dominant religion in Poland.

The Chasidim.—The people who bear this name, meaning "the pious ones," constitute a sect dating from about the middle of the 18th century, and which exercised a profound influence on the Jews of eastern Europe. In its inception, as Dr. Schechter states in his "Studies in Judaism," it was a revolt against the excessive casuistry of the contemporary rabbis and "a protest of an emotional but uneducated people against a one-sided expression of Judaism" without feeling and affection. It was to develop rapidly into mysticism, the reveries and revelries of the Cabala, which produced incalculable evil wherever it spread. Its founder was Israel Miedzibocz (1698-1759), later called

Israel Baal Schem, shortened into Bescht, born in a small village in Bukowina, and about whose childhood and youth wondrous legends are narrated. He became a rabbi in Podolia and Wallachia, teaching his doctrines to eager disciples and working miracles. In some respects he was an Essene of the 18th century, and he has been both condemned and admired. A religious revivalist, he drew much of his inspiration from the 'Sohar,' aptly called the Bible of the Cabalists, a clever literary forgery of the 13th century; but his idealism became a downward development in the sect's subsequent history. Under his successor, Beer of Mizrach, Chasidism extended to a more learned circle, who in their turn exercised a wider influence which led to many divisions and degeneracy. They were fiercely opposed by the rabbinical Jews. In Wilna their writings were publicly burnt (1772), and they were put under the ban. Solomon Maimon in his autobiography gives an account of this sect. It is still in full swing in eastern Europe, an aberration that will pass away with the spread of modern culture.

Other Sects.—The Falashas of Abyssinia, the Daggatouns of the Sahara, the Black Jews of India and Cochin-China, may be regarded as sects or colonies, along with the few remaining Jews in Kai-Fung-Fu, Province of Honan, China, and are mentioned to show the variety of type in present-day Israel. The divisions into "orthodox," "conservative" and "reform" Jews are largely arbitrary, and await more exact classification.

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Jewish Women's Council. Founded September 1893, this organization has been of marked value in awakening the interest of American Jewesses in the history and literature of their special creed as well as in developing among them modern methods in educational and charitable. Affiliating with the National Council of Women it has arrayed on a common platform its representatives. The latest survey of its condition and workings was given at its third triennial in Baltimore, Md., 2-11 Dec. 1902. There were present 3 officers, 7 directors and 52 delegates from 26 sections, with 2 delegates from Junior sections. Addresses were made by Miss Jane Addams, of Hull House, Chicago, on "The New Social Spirit"; other topics discussed were: "Aspects of Judaism in Cities and Small Towns," "Federated Charities," "The Juvenile Court." The Council consists of 64 active sections, with about 8,000 members, and 16 junior sections, with about 500 members. There are 82 study circles, 2,000 members, studying Jewish history and literature, and 12 circles studying methods in philanthropy. It has 18 religious schools among the poor, with 19 paid and 141 volunteer teachers, reaching 2,500 pupils. Thirty-three sections carry on activities in philanthropy, with settlements, sewing and industrial schools, five kindergartens, one manual training school, two gymnasiums, two free baths, two day nurseries, four personal service groups, two kitchen gardens, and other forms of useful activity, often open to all creeds. Cooperation is encouraged with the State Federation of Women, International Congress of Women, the National Jewish Hospital for Consumptives at Denver, Colo.,

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the National Needlework Guild and the Consumers' League. Mrs. Hannah G. Solomon, of Chicago, is president of the organization (1902-5).

Jews and Judaism, the religion of the Jewish people—whether called Jews, Israelites, or Hebrews—based upon the Old Testament, and developed in their ages of alternate wandering and settlement in various lands. Judaism presents a series of changes from age to age, and is inseparable from the history of the Jewish race. The story of Judaism is the story of the Jew. From its rude beginnings in the era of Abraham the Patriarch, down through the centuries of Bible environment; from the formation of a kingdom to the final destruction of Jerusalem by the Romans; from the period of dispersion East and West to the dawn of the Middle Ages; then through successive social and political upheavals to the birth of modern times and the gradual shifting of nations and ideas until the present day;—through all these vicissitudes Judaism has ever been moving, influenced by every current and new condition. In the days of Abraham it was ethical Monotheism; in the era of Moses, Mosaism; in later ages, when it was likely to degenerate, Prophetism arose to inspire new life. When the national existence was reaching its end Talmudism was its protecting garment, to continue as Rabbinism for a long period, and it is still vital in many lands. Then with Moses Mendelsohn (q.v.) and the French Republic, modern Judaism began a new era, which was to develop still further with the spread of individualism in life and thought, under whatever names, conservative or reform, it was known. To realize what Judaism is, it must be studied in its broader range as well as in close detail. It must not be limited to one period, and it must not be made co-extensive merely with its Biblical or post-Biblical epoch. Judaism awaits its historians, and their task is one that demands not only the exact knowledge of the origin, growth, and development of Jewish tradition, customs, rites, and laws, but also a comprehensive survey of the civilizations with which the Jew came into contact, and to which he gave and from which he received so much. Judaism may be only on the threshold of its influence, for at no period since its beginning has it been more diffused and universalized through the planting of the Jew in every land on the globe.

Ancient Jewish History.—The early history of the Jews is identified with that of Palestine, as told in the Old Testament. The narrative proper begins with Abraham and the Patriarchs, and continues through the story of Joseph in Egypt, to which Israel and his family remove, and the years of oppression under the Pharaohs. Then Moses appears as a deliverer, the revelation on Mt. Sinai follows, and a code of laws is given to the people, who form a theocracy, with rites sacrificial, after the fashion of their day, and a hereditary priesthood. The conquest of Canaan begins a new era—the period of the judges—but as the nation grows more warlike and becomes envious of its neighbors, the judge must give way to a king, and Saul, David, and Solomon successively reign. The builder of the temple, the central figure in Oriental legend, could not assure peace to his kingdom, and a division followed. Of the two kingdoms that of

Israel, with its capital first at Shechem and later at Samaria, was the more extensive and populous, embracing 10 of the tribes; but it was addicted to idolatry and fell captive to Sargon of Nineveh (721 B.C.). The kingdom of Judah, consisting of the tribes of Judah and Benjamin, was more faithful, but deplorably weak, and was conquered by Nebuchadnezzar, by whom the temple was destroyed (586 B.C.). In 536 B.C. Cyrus allowed the temple to be rebuilt, and in 516 B.C. it was finished under Ezra and Nehemiah.

Persian rule and influence, to which the Jew owed much, were succeeded by the sway of Egypt, not less vital for Judaism's growth. Under Ptolemy II. (Philadelphus), the Septuagint version of the Old Testament was written, which familiarized the Greek world with Jewish thought. Another change of masters subjected the Jew to Syrian supremacy, under which occurred the Maccabean revolt, followed by internal schism and a gradual weakening of national vitality under Herod, with Rome eager to despoil.

The Final Dispersion.—A fierce struggle to regain fatherland and liberty in the last days of Nero was fruitless. The temple was again destroyed, Jerusalem reduced to ruins, and the dispersion began in earnest (70 A.D.). A further revolt by Bar-Cochba, in the reign of Hadrian (132-135 B.C.) was ineffective. Jews were forbidden to enter Jerusalem, whose very name was changed to *Ælia Capitolina*.

A period of intense significance for Judaism had now arrived. It was to exchange one strip of land for the wide world, and for better or worse encounter new currents which were to change its form and destiny. The Palestinian phase was to give way to a broader development, which might have been a dangerous experiment if the Old Testament basis, the sacredness and authority of the law (*torah*) had not been retained. The remnant of Judah, however, met the issue with courage, and in every land of their dispersion managed to preserve a certain national character, due to their observance of national customs and traditions, while the ages of persecution only made them more firmly attached to their religion.

Jewish Learning.—The story of the Jews in the dispersion is a record of varied experience, a history written in sadness. The dispersion was a *via dolorosa* from land to land. Long before the final overthrow Jewish settlements were made in Italy and Asia Minor, in Egypt, North Africa and Babylonia. But now enforced exile scattered them in all directions. Happily the leaders concerned themselves with intellectual and spiritual factors, and in Palestine and Babylonia schools arose which were to preserve the religion and national consciousness more effectively than priest and sacrifice ever could have done. When Johanan ben Zakkai founded his school at Jamnia, while the ruins of Jerusalem were still smoking, the Romans were unaware that a power had arisen which was to maintain Judaism through centuries of Roman, Christian, and Mohammedan sway, and amid every mediæval and modern condition. The study of the law, the interpretation of tradition, the development of custom and prayer, the rise of synagogues, the organization of a distinct religious hierarchy, the birth of Talmudism; these were

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the factors which made the vanquished victors, and gave them life and influence when conquering races had passed away. It was fortunate that in the struggle between the Persian and Byzantine empires, as in later centuries between Caliph and Christian, or between rival pontiffs and emperors, the Jews were largely students, and had no "dark ages," such was the marvelous influence of their torah and Talmud, while in the conflict of opinions they preserved their intellectual vitality and breadth.

In the Middle Ages.—It is impossible within present limits to give more than a brief outline of the history of the Jews in the dispersion. With the breaking up of the Roman empire and the rise of Islam, the Jews began to feel the pressure of still other new masters, whose rule was not without its occasional gleams of sunshine. In the East, with Islam firmly settled in Persia and Mesopotamia, the condition of the Jews improved, their academies flourished, and a line of famous scholars, the gaonim, kept alive Jewish learning until 1036 A.D. In the West, chiefly in southern Europe and Spain, the spirit of persecution was rarely absent, although there were golden centuries in Spain under the caliphs, and learning flourished in France and Italy despite the enmity of pontiff and king. Jewish traders became the intermediaries in commerce; Jewish physicians were notable figures at the courts; and Jewish teachers gave instruction to lovers of learning. The liberal spirit of the caliphs at Bagdad, Cordova, and Cairo was emulated in Christian countries. In Spain, the Hebrew "Sepharad," the Jews enjoyed a high degree of favor under the caliphs (711-1150). They furnished ministers of state, scholars, scientists, poets of distinction. For 150 years (1150-1300) their condition under the Catholic kings was fairly prosperous. But soon restrictions became the order of the day, they lost the rights of Spanish citizens, were secluded in special quarters of their own, and massacres ensued, while some of their stateliest synagogues were converted into churches. This was the period when many Jews yielded to baptism, practising in private, however, Jewish rites: they were called "Marranos," or secret Jews, and included some of the noblest families in Spain. With the birth of the Inquisition at Seville in 1480, conditions became still more intolerable, and expulsion followed in 1492, 300,000 Jews leaving Spain. Four centuries later Spain was to offer shelter to Jewish refugees from Russian persecution; and its government is now restoring the famous synagogue at Toledo, which had been turned into a church, and showing a spirit of reparation that tells the story of humanity's progress.

The Jews in Modern History.—The exiles from Spain, the Sephardic branch of modern Jewry, found refuge in Italy and Holland, after a temporary stay in Portugal, where they took active part in the Renaissance. Great numbers, too, emigrated to Turkey. It was Elias Levita who, through his students, Sebastian Münster and Paul Fagius, introduced Hebrew studies into Germany, while Leo Hebraeus (Judah Abra-banel) was a famous Neoplatonist. Luis de Torres, a Jewish youth, participated in the quest of Columbus, and a Jew, the pilot Gaspar, aided Vasco da Gama in his search for a water-route to the Indies, whose plans, too, were assisted by Abraham Zacuto, the scholar and astronomer,

a teacher of the University of Salamanca, and later astronomer and chronographer to Manuel the Great of Portugal. Dark days followed the exile from Spain, and in the general sorrow mysticism spun its weird spell as the Cabala gained adherents, while the methodical study of the Talmud was to degenerate into one-sided scholasticism and intellectual jugglery. It was an era relieved, however, by some bright names. Joseph Nasi, Duke of Naxos, was a favorite of Sultan Selim II., who wished to make him king of Cyprus; Solomon Ashkenazi was Turkish ambassador to the republic of Venice; Benedict Spinoza, the thinker, and Sabbathai Zebi, the pseudo-Messiah, were products of the same century. Manasseh ben Israel, whose features were painted by Rembrandt, opened negotiations with Oliver Cromwell for the return of the Jews to England, from which land they had been banished in 1290. With the further migration of the Jews into Slavic countries and their closer segregation, due to the spirit of persecution, which was as bitter as in the era of the crusades, a new language or jargon—the Jewish-German—arose among them, which is now (1903) receiving careful scientific study. In the year of Luther's Pentateuch translation (1523) a Jewish-German dictionary appeared at Cracow, and in 1540 the first Jewish-German translation of the Pentateuch was issued there.

In the Middle Ages the charge of usury was often brought against the Jews, and doubtless was a motive for popular outbreaks against them. Usury is strictly prohibited by the Mosaic law. If, in ages when the Jew was disqualified from following agriculture or other ordinary pursuits, he had recourse to finance and often lent money at excessive rates, kings, nobles and priests were just as guilty, although the Jew was usually the scapegoat. "Every country has the Jews it deserves," is Karl Emil Franzos' pertinent saying. With civil and religious liberty there would be no cause for the ghetto, for narrow exclusiveness, for charges of usury, and other accusations. The 17th century, with the Thirty Years' War, which made nearly all of central Europe a battle-ground, had its full share of persecutions for the Jews, and many of the fairest communities were despoiled, the Jews in Poland losing 200,000 men, women, and children in the Cossack invasion (1648-51). That century marked the lowest ebb of Jewish life and aspiration. It was, fortunately, to be succeeded by the dawn of a new era. It was Moses Mendelssohn (1729-86) who strove to awaken his coreligionists to new life, and to rise to the level of the highest culture of their time, without abandoning the essentials of their religion. As his friend Lessing sought to emancipate German literature from French models, so Mendelssohn labored to free the Jew from mediævalism in thought and custom. It was a return to Jewish idealism and humanity that he advocated, a departure from the social and intellectual ghetto forced upon them by bigotry from within and without. From him dates the era of emancipation which was ushered in as well by the French Revolution. With their gradual acquirement of full citizenship in European lands, resolute changes in forms and ritual were imperative; and the mediæval atmosphere in prayer and ceremony was to pass away. Scholasticism was also to be overcome by Leopold Zunz (1794-1886) and the coterie of well-equipped scholars who opened

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a new path in the study of Jewish history and doctrine and showed the evolution of prayer and ceremony. With him were ranged S. L. Rapoport (1791-1867), S. D. Luzzatto (1800-65), Zacharias Frankel (1801-75), Abraham Geiger (1810-74), Samson R. Hirsch (1808-88), H. Graetz (1817-91), L. Loew (1811-75), Samuel Holdheim (1806-60), and the still surviving Moritz Steinschneider (1816).

To-day the condition of the Jews abroad may thus briefly be summarized: In Russia, Rumania, and Galicia, which contain the great majority of Israelites, they suffer social and political exactions, and are under strict mediæval restraint so far as their religious state is concerned. They are more or less rigid Talmudists, and are least influenced as a whole by the modern movement, although there are signs among them of new life. The revolution of 1848 completed the work of the French Revolution in assuring political equality to the Jews in Western Europe. In 1858 Lionel de Rothschild was the first Jew to take his seat in the English Parliament. London has had several Jewish lord mayors and a Jewish master of the rolls (Sir George Jessel). Anti-Semitism has rapidly lost its fangs in France, Austria, Hungary, and Germany, whose Jewish citizens are indistinguishable, save in religion, from those of other creeds. In Italy, Rome grants a site for a new synagogue not far from the Arch of Titus, mute witness of Israel's vitality. A Jew is Italian minister of war. What a transformation since the days when Jews were thrown to the lions or forced to live in the catacombs! As a result of the admission of Jews to every field of activity, they furnish their quota of famous names in all lands in music, art, science, literature, philanthropy, commerce, and politics.

Zionism, etc.—The Zionist movement of the past decade, so far as it aims at a restored Jewish nation in Palestine, numbers the largest body of adherents in Russia and Rumania; but with their full acquirement of political rights their attitude will change. Great Britain's offer of land in East Africa for a Jewish settlement under British sway is seriously considered by Dr. Herzl and the Zionists (1903), and may pave the way for practicable colonization both there and elsewhere, which will materially lighten the Jew's burden in persecuting lands, and give him new life and activity under more favorable conditions.

Continuity of Judaism.—The outline of Jewish history from the earliest times to the present, with observation of conditions throughout the world, proves that Judaism has always been a living religion in every environment and despite the cross-fertilization of ideas that it has encountered in Babylonia, Rome, Egypt, Persia, Arabia, Spain, mediæval Germany, and Italy. The law of adaptation has left its mark on the thought and principles of the Jewish belief. While the sources are in the Pentateuch or torah, the stream of Jewish tradition is continuous, and Judaism, practically the tradition of the Jews, may be defined as ethical monotheism illuminated by national customs and observances. A double stream of thought is to be discerned—a particularistic and a universal, exclusiveness and breadth, Jewry and the wide world, the God of Israel and the God of humanity. These tendencies appear not only in the Old Testament, but throughout the entire stretch of Jewish lit-

erature, and are still to be met in the views of modern rabbis of the various schools, old and new. But Judaism is none the less a fixed religion, even if it is difficult to define, and demands no assent to formal articles of belief. Its first intuition is belief in God, no blind power, but with the attributes of unity, incorporeality, eternity, omniscience, and omnipotence, and whose justice is tempered with mercy. The reality of revelation is its second principle, the revealings on Sinai through Moses, and their confirmation through the prophets of laws and statutes, the moral and ceremonial law—the immutability of the torah. As a necessary corollary comes a third principle, future reward or punishment for those who obey or transgress the law. Compensation in the hereafter implies the soul's immortality. Whatever varying views were held as to these principles and their interpretation by earlier and later rabbis, amid all exaggerations and aberrations to which they were subjected, giving rise to sect and schism, the ethical basis of Judaism was unquestioned, and action, not moralizing, was always the highest duty. The creed of Judaism has been defined from time to time by different rabbis, the most famous of whom, Maimonides (1130-1205), gave the most widely accepted exposition in 13 articles embodying these points: Belief in a creator, in His unity, incorporeality, eternity, and that He alone is to be worshipped; belief in prophecy, and that Moses was greatest of all prophets both before and after him; that the torah was revealed on Sinai, and possesses immutability; that God knows the thoughts and actions of men; belief in reward and punishment, in the coming of the Messiah, and in the resurrection of the dead. These articles were opposed by some of his contemporaries, as they have also been by some later rabbis, who frame different classes of doctrine or dogma and otherwise modify Maimonides' principles, which are still, however, regarded as authoritative by the large majority of Jews to-day. (See MAIMONIDES.)

Ceremonial and Festival Usages.—The ceremonial code and historic ritual are vital factors in the preservation of Judaism—"signs," and observances like circumcision, the Sabbath, the festivals, and the dietary laws. Their aim is to quarantine the Jew from idolatry and secure the permanence of his God-idea, and to ensure self-control over passion and appetite, promoting physical and moral growth, and maintaining family happiness and purity.

The chief Jewish festivals are the New Year, the Day of Atonement, Tabernacles, Passover, and Pentecost, with Purim, Hanukkah (to celebrate the victory of the Maccabees), and Fast of Ab, in memory of the fall of Jerusalem.

The breadth of Judaism is not to be lost sight of amid the many observances that are part of its historic programme. The Jew's original Semitism has developed into a cosmopolitanism which makes him a citizen of every land that assures him civil and religious liberty. He can be conservative in England, liberal in Germany, a formalist in France, a pietist in Poland, a mystic in Turkey, and can wear in the United States an intellectual coat of many colors that would astound his brethren in India. The breadth and catholicity of Judaism are organic; the Jew does not seek proselytes; he believes with Maimonides that "the pious of all nations

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have a share in future bliss.⁹ His aspirations are not tribal; he believes in the perfectibility of humanity; and whether his Messiah be a person or an epoch, he holds that the time will come when all men will acknowledge the unity of God and the brotherhood of man.

Jewish Statistics.—The figures of Jewish population, as contained in the 'American Jewish Year Book' for 1900-01, are herewith given. For the British Empire the total is 148,149, divided as follows: England, 97,350; India, 17,194; Australia, 15,268; Canada, 6,414. For other countries: Austria-Hungary, 1,871,414; Russia, 5,700,000; Rumania, 300,000; Germany, 567,884; Turkey, 350,000; France, 72,000; Italy, 50,000; Netherlands, 97,324; Egypt, 25,200; Morocco, 150,000; Belgium, 4,000; Argentina, 6,735; Denmark, 4,080; Greece, 5,792; Persia, 50,000; Serbia, 4,652; South Africa, 10,000; Switzerland, 8,069; Sweden and Norway, 3,402; Spain, 2,500; Peru, 498; Bulgaria, 22,617; Venezuela, 411; Abyssinia, 120,000; China, 300; Algeria, 43,500; Tunis, 4,500; Curaçao, 831; Surinam, 1,250; making, with the United States (1,200,000), a total of about 11,000,000 for the world. For Jewish statistics of the United States see JEWS IN AMERICA.

Bibliography.—Among the more important ethical and philosophical writings of the rabbis which are generally regarded as setting forth what is characteristic in Judaism—not to refer to special works of one-sided tendency—the following are recommended: Saadya (10th century), 'Emunoth Vedeoth' (Beliefs and Opinions); Bachya (11th century), 'Choboth Ha Lebaboth' (Duties of the Heart); Hallevi (12th century), 'Cuzari'; Maimonides (12th century), 'More Nebuchim' (Guide of the Perplexed); Albo (15th century), 'Sefer Ikkarim'; Troki (16th century), 'Chizzuk Emunah'; Mendelssohn (18th century), 'Jerusalem.' For general information on the subject of Jews and Judaism may be read: Graetz's 'History of the Jews'; Morris Joseph's 'Judaism as Creed and Life'; Stanley's 'History of the Jewish Church'; Daly's 'The Settlement of the Jews in North America'; Kayserling's 'Christopher Columbus and the Participation of the Jews in the Spanish and Portuguese Discoveries'; 'Publications of the American Jewish Historical Society'; Schechter's 'Studies in Judaism,' and many issues of the American Jewish Publication Society. Within recent years in particular a rich and extensive literature has sprung up in this line of study in England, Germany, France, Russia, Italy, and elsewhere.

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Jews in America. Although the Jewish population of America has been greatly increased by immigration only since 1881, Jews have been closely identified with American history for centuries, and some of that race even settled in this country in Columbus' day.

Before taking up the history of the Jews in America, some statistics concerning the American-Jewish population at various periods will be in order, as tending to throw light on more isolated historical incidents relating, for the most part, to the experience of a small fraction only.

Statistics.—The latest and most authoritative statistics as to the present Jewish population

of the United States are furnished by the 'American Jewish Year Book' (September 1903), wherein it is computed that the total number of Jews in this country is 1,127,268, of whom 500,000 are credited to New York State, 28,000 to California, 75,000 to Illinois, 25,000 to Indiana, 26,500 to Maryland, 60,000 to Massachusetts, 50,000 to Missouri, 25,000 to New Jersey, 50,000 to Ohio, and 95,000 to Pennsylvania; all the other States and Territories, including Hawaii, Porto Rico, and the Philippine Islands, and also the District of Columbia, likewise containing some Jewish residents. In making up this total, account is taken of the fact that 761,598 Jewish immigrants arrived at the ports of New York, Philadelphia, and Baltimore from 1881 to 1 July 1903. The same authority computes the Jewish population of America, exclusive of the United States, as follows: Canada and British Columbia, 25,000; British West Indies, approximately, 2,500; Argentina, 22,500; Brazil, 3,000; Cuba, 4,000; Mexico, 1,000; Curaçao, 103; Surinam (Dutch Guiana), 1,121, and Venezuela 411; making 1,186,903 in all for America. These figures are mere estimates, than which nothing more accurate is at present obtainable; but they are no doubt approximately correct, being based upon partial actual counts, analyses of death-rates, and reports of competent judges in the various localities; and having also been reviewed from time to time in the light of criticism and new data. If anything, the figures are probably somewhat too low, the city of New York, in its five boroughs, being credited by competent judges in 1903 with a population of over 600,000 Jews, which would make the estimate for the State above quoted about 150,000 too low. Estimates for other districts are also likely to be low; although that given for Cuba is undoubtedly too high. In rough figures, then, the Jewish population of the United States to-day may be estimated at 1,200,000.

The first systematic attempt to secure statistics of the Jewish population in the United States culminated in the publication of a report by the Union of American Hebrew Congregations in 1880, giving estimates for each State and city in the Union, and aggregating 230,257 persons. In connection with the national census of 1890 statistical information was gathered regarding Jewish congregations in the United States, and the total number of Jewish communicants was estimated at 130,496, belonging to 533 church organizations. Of these, 316 organizations, having 122 church edifices, valued at \$2,802,050, and 51,597 communicants, are to be credited to Orthodox Judaism, while Reform Judaism counted 217 organizations, having 179 church edifices, valued at \$6,952,225, and 72,899 communicants. A very large majority of the Jewish immigrants arriving in the United States since 1890 belong to the orthodox wing, and even the figures of 1890 undoubtedly disregard numerous small, often unorganized, orthodox congregations, from whom it was relatively more difficult to secure reports. In 1818 the Jewish population of the United States was estimated at 3,000 only; in 1848, at 50,000. In South America there were several thousand Jews prior to 1650, the greater part of whom were in Brazil, as noted below; but hostile laws and the persecutions of the Inquisition, while driving some

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to the West Indies, and even as far north as New Netherlands, caused several thousand Jewish settlers in Spanish and Portuguese territories to totally give up their Jewish identity.

It might be said that there were successive tides of Jewish emigration to America from European countries, fairly well separated from each other in point of time. During the first 250 years after the discovery of America the settlers were mainly Jewish immigrants of Spanish-Portuguese stock, with only an occasional sprinkling of German, French, English, and Polish Jews. German Jewish emigration becomes considerable only a short time before the American Revolution (though evidence is accumulating that it took upon itself larger dimensions and at an earlier period than is commonly believed); it was stimulated by the reactionary measures following the Napoleonic wars and the revolution of 1848, and began to include emigrants from the Austro-Hungarian empire, and later on an increasing number of Poles. The Russian-Jewish exodus, which began about 1881, was by far the heaviest of these various currents of emigration, and was itself succeeded or joined by a Rumanian-Jewish wave about 1900. For Jewish statistics of other countries see JEWS AND JUDAISM.

Jews in the Spanish and Portuguese Colonies.—Before the discovery Jews were actively identified with the fate of America, as may be said without reference to the curious and once widely accepted theory that the American Indians are descendants of the lost Ten Tribes. Emilio Castelar, the late Spanish statesman and historian, referring to the coincidence that the Jews were expelled from Spain in the year that Columbus started on his first voyage of discovery—a circumstance noted by Columbus himself in his journal, and repeatedly thereafter commented upon by Jewish historians—makes this observation:

It chanced that one of the last vessels transporting into exile the Jews expelled from Spain by the religious intolerance of which the recently created and odious Tribunal of the Faith was the embodiment, passed by the little fleet bound in search of another world, whose creation should be new-born, a haven be afforded to the quickening principle of human liberty, and a temple reared to the God of enfranchised and redeemed consciences.

But Jewish aid to Columbus was not limited to Jews accompanying him on this first voyage (including Luis de Torres, a new convert to Christianity, who went as interpreter because of his knowledge of Arabic, and settled before 1500 in America), nor to the circumstance that Columbus carried with him, as aids on his voyage, a sea-quadrant called "Jacob's Staff," invented by a Spanish Jew, and astronomical tables and charts invented by another Jew. The more significant and important fact is that Jewish financiers at the Spanish court were his leading patrons, and advanced the money for his voyage, as evidenced by original account-books still found in the Spanish archives; so that it was a mere recognition of this circumstance that induced him to address the first two letters (now justly famous, and the earliest copies of printed editions of which command thousands of dollars from book-fanciers) narrating his discovery to those two secret Jewish friends, Louis de Santangel, chancellor of Aragon, and Gabriel Sanchez, royal treasurer. In the light

of such facts the late Herbert B. Adams wrote that "not jewels, but Jews, were the real financial basis of the first expedition of Columbus." The revenues needed to fit out the second expedition were secured from the proceeds of the property, of which the expelled Spanish Jews were despoiled by the Inquisition at the time of their expulsion from Spain.

In spite of prohibitions upon Jewish settlement in Spanish and Portuguese America, many Jews rapidly emigrated to the New World from among those exiled from Spain and Portugal; occasionally, in spite of the inconsistency involved, in view of those prohibitions, Jews and Jewesses were forcibly transported to America by the state through the agency of the Inquisition. By 1548 Jews are referred to not merely as having settled in Brazil, but as introducing sugar-culture there, which they transplanted from Madeira. The smoking of tobacco had been introduced to Europeans even before 1500 by Luis de Torres, a companion of Columbus. Occasionally, enormous sums of money had to be raised and given to the crown in order to effect suspensions or revocations of prohibitions upon Jewish settlement in the Spanish and Portuguese colonies. But the Inquisition and its terrors were introduced even into the New World; hence Jews found it advisable to try to conceal their faith under the cloak of Christianity; and it is principally in the records of the Inquisition that we find proofs of the Jewish practices of many of these settlers—called Marranos or secret Jews—whose trials commonly resulted in imprisonment, frequently in death at the stake, and were at all events followed by confiscation of their property.

In Brazil, Jewish settlers actively aided the Dutch in effecting their conquest of that country, about 1620, after which the Jews *en masse* threw off their Christian disguise and publicly professed their own religion. The Dutch West India Company (q.v.), which obtained the proprietorship of Brazil, had many influential Jewish stockholders, and under their auspices large numbers of Jews from Portugal, Holland, and Germany immigrated. Jewish residents are referred to about 1640 as owning the principal sugar-plantations of Brazil, and as heavily interested in the diamond industry then developing there; and there is also evidence that a Jewish literature sprang up in Brazil at this time. Some idea of their numbers may be gathered from the fact that at the time of the surrender of Recife (Pernambuco) to the Portuguese, after its recapture from the Dutch, soon after the middle of the 17th century, that city alone contained about 5,000 Jews, even after many had departed from the city. In smaller numbers they were also established in other cities of Brazil, in Mexico, Peru, the West Indies, and at other points. The Dutch capitulation of Brazil in 1654 led to their flight in large numbers from that country, their migrations leading them northward, particularly to the West Indies, and one party of refugees even becoming the nucleus of a Jewish settlement at New Amsterdam (New York city) in 1654. Many, however, remained in the South American colonies, and their Jewish identity was gradually lost under the hostile influences at work. The settlements under Dutch auspices at Surinam,

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Cayenne, and Curaçao, are deserving of particular attention.

Of the professing Jewish inhabitants now to be found in these districts, enumerated in the statistics just considered, very few are descendants of the original Spanish settlers, the great bulk of them being comparatively recent arrivals from Germany, Russia, and Rumania. Through the munificence of Baron de Hirsch (q.v.) millions of dollars were employed about 1891 in the purchase of land and equipment for the use of agricultural colonies of Russian Jews established under his auspices in Argentina, where several thousand Jews settled, though they have met with only moderate success.

West Indies.—Reference has already been made to early settlements of Jews in Cuba and other West Indian islands. Their settlement in Jamaica was particularly important on account of their numbers and the once great commercial importance of the island. For the latter reason, their residence in the Barbados, at St. Eustatius, Martinique, and in the Danish West Indian colonies also led to important consequences. Reference will be made hereafter to this circumstance. Except in Cuba, the decline of the above named places commercially has caused a decided diminution in the number of their Jewish inhabitants, and to-day the chief interest in the settlements is historical.

Early Settlements in the United States before the Revolution.—There are indications of some isolated and casual arrivals of individual Jews within the present limits of the United States prior to the arrival of the party from Brazil in colonial New York during the Dutch régime, in 1654; these were in Maryland, Virginia, and New England, to say nothing of a party of Jewish soldiers and sailors who seem to have reached New Netherlands (New York) in 1652. These instances (other than those in the Dutch colony) are purely casual, however, and unimportant, because Jews were not allowed at this time to live as avowed Jews in any of the principal countries that then had colonies in America except Holland. Prohibitions against their settlement were in force (though occasionally ignored) in Spain, Portugal, England, and to some extent in France. Holland alone at this time welcomed the Jewish refugee, to her great commercial advantage; and this "common harbor of all opinions and of all heresies" was, logically enough, destined to establish a precedent for granting religious liberty also in the New World. It is true that in New Netherlands Governor Peter Stuyvesant (q.v.) was decidedly hostile to the Jewish arrivals, as were also some of the early Dutch ecclesiastical authorities; but, thanks to the leveling and humanizing influence of commerce, and to Jewish holdings of stock in the Dutch West India Company, the directors of that company, 26 April 1655, instructed their governor that the "Jews shall have permission to sail to and trade in New Netherlands, and to live and remain there, provided the poor among them shall not become a burden to the company, or to the community, but be supported by their own nation"; and Stuyvesant was strongly reproved soon after for seeking to thwart these clearly expressed wishes of the company. The emancipation of Jews was, however, only gradual; certain restrictions were continued through

the whole colonial period, though they decreased from time to time, and in importance. Public worship, as distinguished from private religious services, was forbidden them till near the close of the 17th century, as was also selling at retail, and certain political rights of citizenship were also denied; but these restrictions in the course of time were largely removed in practice, so that the adoption of the first constitution of the State of New York, in the Revolutionary period, which established absolute religious liberty, conferred in effect few, if any, privileges on the Jewish residents of that State, which they had not already virtually enjoyed. In the interior, the number of Jewish residents had grown somewhat by emigration from Germany, Hungary, Poland, and also from England, which, under Cromwell, readmitted the Jews soon after the time of their settlement in New Netherlands; but the increase in numbers through immigration was not great till after 1800, for there were few Jews in England, and still fewer who desired to emigrate from there, while emigration to New York and New England prior to the above date from any of the other designated countries was very small.

To Newport, R. I., Jews emigrated very soon after they first settled in New Amsterdam, and Roger Williams (q.v.) in terms included them in his programme for establishing a colony where religious liberty would be accorded to all sects and creeds. In the course of time they erected a synagogue here also, as well as in New York, and established a community which contributed most materially to the commercial prosperity of Newport, which city far outrivaled New York for some decades before the Revolution, and until, during that struggle, its shipping interests received a blow from which they never wholly recovered. Here also, there were some retrogressions during the colonial period from Roger Williams' enlightened declaration of principles; but on the whole, Jews were most prosperous residents of Newport during the latter portion of the colonial period. Even though the colony never was numerous, it embraced such merchant princes as Aaron Lopez and Jacob Rodrigues Rivera, and its fortunes were commemorated, after all the old-time residents had departed, in Longfellow's famous lines on "The Jewish Cemetery at Newport." Already in the colonial period Jewish settlers occasionally found their way into Connecticut, also to Boston, and even, it would seem, to Maine, but they were very few in number, and the present Jewish residents of New England date almost entirely from the period of German settlement after 1848, followed by a much more considerable Polish and Russian-Jewish settlement toward the end of the 19th century. About 1820 Major Mordecai M. Noah, at one time United States Consul to Tunis, developed a fantastic plan for founding a Jewish state for the oppressed Jews of other lands under his own "judgeship," near Niagara Falls, at a place he named, "Ararat, City of Refuge," and attempted to tax all the Jews throughout the world for this purpose, but the scheme merely aroused amused attention. Other less ambitious early colonization schemes also were formed.

Pennsylvania, under William Penn's generous plan for founding a home for victims of persecution, attracted Jewish settlers, and in the early

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decades of the 18th century a little stream of immigration began which brought a number of German, English, and Polish Jewish settlers to the colony, whose numbers were increased, after the capture of New York by the British in 1776, by the arrival of Portuguese Jews from that city. The Jewish settlement in Lancaster, Pa., was made about the time of the American Revolution; and there was a small Jewish immigration into Maryland and Virginia, with communities in Schaefersville, Easton, Baltimore, and Richmond. Before the close of the Revolution a Portuguese synagogue had been erected in Philadelphia; soon a German Jewish congregation was established there; and about the same period one was erected in Richmond, Va. The laws of Maryland prohibited Jewish settlement, and as early as 1658, Dr. Jacob Lumbrozo, "the Jew physician," figured there as defendant in a blasphemy trial, which nearly cost him his life. Baltimore is of particular interest because it was the only city in the United States in which systematic and long-continued efforts were necessary, subsequent to the Revolution, in order to secure full civil and political rights for Jews as such: they acquired them finally in 1826. Georgia attracted Jews almost immediately after the founding of the colony, parties of both German and Portuguese Jewish settlers having arrived at Savannah in 1733. Some of these were indigent Jews, who were assisted to emigrate by coreligionists in England. Offshoots from this colony migrated to South Carolina before the first half of the 18th century, and a congregation was formed in Charleston in 1750. By the time of the Revolution, and for some decades thereafter, Charleston contained one of the most important and prosperous Jewish communities in the United States. In both of these colonies Jews seem to have figured as holders of responsible civil office before the close of the Revolutionary War.

The various places which contained Jewish communities prior to the Revolution have now been enumerated; the total Jewish population embraced in them and in other and more isolated settlements was, as seen, somewhat less than 3,000 in the year 1800.

Interior Settlements.—Space does not permit consideration of the various Jewish settlements and their date of establishment outside of the limits of the 13 colonies. The great majority of Jewish residents of the United States still reside along the eastern coast-line. In time, the westward movement carried Jewish settlers along with it, some into interior cities in the original 13 States, others farther west. By 1800 there were several Jewish residents at Pittsburg. Judah Touro (q.v.), the well-known Jewish philanthropist, went to New Orleans about 1801, and Jews were destined, during the latter half of the 19th century, to achieve considerable political distinction there, though probably there were some Jewish settlers in the Louisiana Territory nearly a century earlier, who were persecuted by reason of the prohibitions in the French "Code Noir" upon Jewish settlement. The first indisputable Jewish resident of Kentucky seems to have settled there about 1808. Ohio appears to have received its first Jewish residents about 1817-19, and after 1830 a considerable tide of German-Jewish immigration flowed toward Cincinnati. In Illinois, which has

to-day a considerable number of Jewish inhabitants (see above), especially in and about Chicago, the first Jewish settler probably arrived about 1841; and after a couple of years, numbers of German Jews began to come. A little later this same tide reached Detroit, Mich. Texas, while still belonging to Mexico, had quite a contingent of Jewish settlers, who began to arrive about 1821. California attracted a considerable number of Jews at the time of the gold discovery in 1849, and in 1850 they had two congregations in San Francisco. It will be observed that the great majority of Jews in the United States are to be found in the large cities.

The reactionary movement that followed the Napoleonic wars in Germany, early in the 19th century, and particularly the barbarous Jewish marriage laws of some of the German states (which, among numerous disabilities from which Jews suffered, were possibly the most objectionable, as they forbade more than a certain number of Jewish couples to live in any district), greatly stimulated German Jewish emigration to the United States from about 1815. After the revolutions of 1848 the political and economic unrest in Germany and throughout Europe caused a particularly valuable and intelligent class of Jewish immigrants to come to this country, including, in addition to Germans, also Hungarians, Poles, and Bohemians; while after 1881 the Russian-Jewish exodus assumed large dimensions, and the Rumanian-Jewish emigration began to be heavy about 1900. The volume of these tides can be gauged by comparing the estimates of Jewish population at various periods, already quoted, with these various dates. The forced emigration of recent years from Russia and Rumania has naturally had the effect of bringing to these shores persons less adequately equipped, and who had known fewer opportunities for development and self-improvement than the earlier immigrants, generally speaking, had enjoyed.

The Jews in American Commerce, Industries, and the Professions.—Reference has already been made to early Jewish activities in the field of commerce, exhibited in Brazil and the West Indies particularly. It is most important here to note the consequences which followed the dispersion of the Jews throughout so many different lands and districts, resulting in their opening of international and intercolonial trade relations with each other long before those having no such ties of relationship or confidence, and no such common language or commercial abilities, were ready for any such mutual intercourse. The result was that in early colonial days Jews were pioneers and prime promoters of intercolonial and foreign commerce in America, which became not merely profitable, but actually indispensable, for the maintenance of the colonies. The most distant points thus became interlinked by means of their Jewish residents. Every industry and branch of trade engaged their attention. Among persons who were particularly prominent in these fields, besides Lopez, Rivera and Touro, already referred to, were Lewis Gomez and his sons, who were exporters of wheat on a very large scale in colonial New York, early in the 18th century; Hayman Levy, the fur-dealer of New York, who had close relations with the

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American Indians, and was at one time the employer of the first John Jacob Astor; David Gradiis of Bordeaux, who is described as having "controlled the trade of France with the West Indies," in the 18th century, etc. Aaron Lopez of Newport had a fleet of over 30 vessels shortly before the Revolution, engaged in trade between Newport, the West Indies, and Africa. Newport Jews also created the spermaceti industry. Jews were among the founders of the New York Chamber of Commerce, and one figures on its seal as a member of the committee receiving its charter from the colonial governor. They were also among the founders of the New York Stock Exchange, and ever since that time have been growing in importance in America as bankers, brokers, financiers, and railroad magnates. They have been particularly influential in certain lines of trade, including the cotton, tobacco, sugar, coffee, jewelry, leather, hides, meat-packing, and clothing industries, and department-store activities.

The Jews of America have produced distinguished inventors, lawyers, physicians, rabbis, journalists, scientists, artists, dramatists, and professors, filling chairs at all the leading universities, far in excess of the proportional number of their race in the population of the country. On the other hand, the large immigration of unskilled laborers into the United States has led to the employment of thousands of Jews here in every industrial pursuit, frequently at very low wages and under unfavorable conditions.

Jews in the Army, Navy, and Public Service Generally.—Prior to the American Revolution there were Jews serving in the militia and in the colonial wars. During the Revolutionary War, their numbers on the army rolls far exceeded their ratio to the total population, and a number achieved distinction above the ranks. The New York Jewish congregation concluded, by a decisive majority vote, to disband, rather than to sacrifice patriotism on the altar of religion, and many of its members fled to Philadelphia, just prior to the British occupancy of New York. In the South a corps of volunteer infantry, known as Captain Lushington's company, composed principally of Jews, was organized in Charleston in 1779, and fought in the patriot ranks. A number of Jews had figured as signers to the Non-Importation Agreement of 1765. Among those on the Revolutionary rolls who achieved military distinction are Col. Solomon Bush; Col. David S. Franks, aide-de-camp to Gen. Arnold before the latter's treason, and who was the bearer of the signed definitive treaty of peace, sent abroad by Congress for delivery there; Isaac Franks, who became colonel of Pennsylvania's volunteers soon after the Revolution, after having served long during the war in the ranks; Capt. Jacob de la Motta; Maj. Nones; Lieut. Seixas; and Deputy Commissary-General of Issues Sheftall, of Georgia. During our War of 1812 and the Mexican War many Jews served in the ranks, and occasionally as holders of important military positions; while during the Civil War the number of Jewish soldiers in the field far exceeded their ratio to the whole population of the country, and they held military positions from brigadier-general down. Hon. Simon Wolf, in his work, *'The American Jew as Patriot, Soldier and Citizen,'*

has, by means of enormous labor and investigation, collected available names and records of Jewish soldiers in the Federal army and navy, in which he reports that during the Civil War, no fewer than 7,884 Jews served, and even these numbers are necessarily incomplete. As the Jews were Union men in the North, so those living in the South generally espoused the cause of the Confederacy; but Mr. Wolf's figures include less than 2,000 Confederate Jewish soldiers. The number included by him as serving in the Union and Confederate navies is almost negligible. A similar list of Jews who served during the Spanish-American War has been compiled (*American Jewish Year Book 1900-01*, pp. 527-622), and includes thousands of names, again exceeding the relative ratio based on that of the total number of persons serving to the total population; and President Roosevelt, years later, felt called upon to compliment them publicly upon their bravery, as indicated by instances of Jews who served under him and were commended for gallantry. Neither have Jews failed to enlist in our navy, for since the latter was instituted, a number of Jews have notably risen from the files to naval distinction, as witness the careers of Capt. Etting, Maj. David M. Cohen of the United States Marine Corps, Capt. Levi M. Harby, Capt. Jonas P. Levy, and "Commodore" Uriah P. Levy, who at the time of his death in 1862 was the ranking officer in the United States navy. Nor have Jews failed to render the government signal services in private life. Haym Salomon, the associate of Robert Morris and Madison, was broker to the Office of Finance, and it was through his hands that the loans from France and Holland to the infant republic passed; he made heavy advances to the government, which at the time of his death was indebted to him in hundreds of thousands of dollars, which have never been repaid, in spite of repeated Congressional reports in favor of the claim. During the Revolutionary period, there were still others who aided the government's hazardous financial fortunes. Among the most distinguished Jewish patriots of the Revolution stands Francis Salvador, who was a member of the South Carolina Provincial Congress and of the General Assembly of that State. On the other hand there were, naturally enough, also a few Tories among the Jews, chief among whom were David Franks of Philadelphia, who had been British commissary-general, during the French and Indian war, together with his father, Jacob Franks. David Franks' daughter, Rebecca Franks, was one of the leading belles and wits of Philadelphia and New York during the Revolution. A number of Jews have served in Congress, both in the Senate and the House of Representatives, the most prominent among them having been Judah P. Benjamin (q.v.), who resigned his seat in the Senate to become attorney-general, secretary of war, and then secretary of state of the Confederate States, and subsequently became leader of the English bar. Several Jews have been U. S. ministers to Turkey and consuls-general, one of the former, Oscar S. Straus, now being a member of the Permanent Court of Arbitration at The Hague. Many have been judges in different States, and several have been attorneys-general of their States. A number have been mayors of leading cities, while many others have held local and

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State offices. Among those who rendered our government most valuable services in trying financial times are J. & W. Seligman & Co. Several Jews, particularly Moritz Pinner, David Einhorn, and M. Heilprin, were active workers for individual liberty in the anti-slavery movement.

Charities and Other Institutions.—The Jewish charities of the United States are unequalled in magnitude and efficiency, compared with the total Jewish population. Naturally enough, the enormous exodus of well-nigh indigent Jews to these shores has greatly increased the burden falling on their more fortunate coreligionists. The amounts disbursed by the organized Jewish charities in New York city alone exceeds \$1,000,000 per annum. Almost every possible field of charitable endeavor is attended to. New York city, for example, contains three Jewish hospitals, a home for incurables, two Jewish orphan asylums, two Hebrew technical schools, an educational alliance, a home for aged and infirm, and an organization of United Hebrew Charities for direct relief; and these are but a few out of scores of charitable societies and institutions. The pure milk depots opened by Nathan Straus, at a heavy loss to himself, in New York—an example which has been followed in other cities—is one of the most effective forms of charitable endeavor, and has saved thousands of infant lives. Various Jews of the United States have contributed hundreds of thousands of dollars at a time in individual instances to charitable purposes, best known among whom Mr. Jacob H. Schiff of New York, who is credited with observance of the old Jewish practice of giving a tithe of his income to charity. The arbitration movement for settling controversies between capital and labor, known as the Civic Federation, has enlisted several Jews in its directorate. The Jewish charities of the United States are being systematized and organized more and more from year to year; aid is being afforded by the newly instituted annual national conferences of Jewish Charities, and under their auspices, removal offices have been opened within the United States to aid indigent immigrants after arrival, to seek locations for them in the interior of the country, and thus somewhat relieve the congestion of the large Eastern cities. Of course all the local New York charities deal particularly with recent arrivals, but the Baron de Hirsch Fund and the Educational Alliance especially address their efforts toward them.

A number of very large mutual benefit and mutual development societies, taking the form of fraternities of Jewish lodges, exist within the United States and do much good, chief among them being the Independent Order B'nai Brith, the Independent Order Free Sons of Israel, and the Independent Order Sons of Benjamin. The recently organized Zionist movement has appealed greatly to many thousands of Jews in America, particularly to the more orthodox, and they have organized numerous societies to aid in establishing a Jewish state, in Palestine or elsewhere, for the benefit of the persecuted Jews of eastern Europe.

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Jew's Harp, a small musical instrument held between the lips, the sound coming from the vibrations of a tongue of metal, bent at a right angle, which is set in motion by being twirled with the fore-finger. The sound is increased in intensity by the breath, and altered in pitch by the shape of the cavity of the mouth, which acts as a reflector. The name some derive from *jeu*, play, from the fact of its being a toy; but more probably it is a derisive allusion to the harp of David.

Jew's Mallow, a pot-herb. See CORCHORUS.

Jex-Blake, Sophia, English physician: b. Sussex January 1840. She was the daughter of a physician, studied medicine in Boston, Mass., 1866-8, and returning to England matriculated at the University of Edinburgh, but was not allowed to complete her studies there and take the degree of M.D., which she subsequently obtained at the University of Bern. She founded the London School of Medicine for Women, the Edinburgh School of Medicine for Women in 1886, and retired from active practice in 1899. She has published 'American Schools and Colleges' (1866); 'Medical Women' (1872); 'Puerperal Fever' (1877); 'The Care of Infants' (1884).

Jez'ebel, the Phoenician wife of Ahab, king of Israel. She was the evil genius of her husband, favored the idolatrous worship of Baal in Palestine, and persecuted the prophets of Jehovah. Her name left a dark stain upon the annals of Israel and survived to the later dispensation where it occurs in the Book of Revelations (Rev. xi., 20) as a symbol of feminine depravity and impiety.

Jhelam, jē'lām, or **Jhelum** (ancient Hydaspes), a river which has its rise in Kashmir. An octagonal tank has been built in a garden at Vernag, and into this reservoir flow springs

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from the Western Himalayas, which form the head waters of the Jhelam. The river flows northwest to the Wular Lake, about 10 miles from Srinagar; then southwest and northwest, forming a curve from Wular Lake through Barambula Pass to Mazufurabad, where it turns south, and flows along the boundary between Punjab and Kashmir, a distance of about 100 miles. Leaving the boundary line at Jhelam it flows southwest into the Chenab River. Its whole course is about 500 miles, nearly all of which it is navigable. The first part of its course is through remarkable mountain scenery and the last through a rich agricultural region. It is the thoroughfare for a number of large cities and small towns. This is the river upon the banks of which Alexander the Great built a war fleet in 326 B.C. and fought a battle with Porus.

Jig, a light quick tune or air to be found in the sonatas of Corelli, Handel, and other composers till toward the middle of the 18th century. The Irish jig, played to a dance also called a jig, is a lively tune of two or three sections written in 6-8 time. The jig is popular among many nations, is distinguished by various titles, and has a certain amount of difference in the steps according to the habits and customs of the people by whom it is adopted. With some it is a sober, steady country dance; with others it is a wild, savage exercise, without point or meaning. With some it is made a means of displaying the agility of the lower limbs of a combined company of dancers; with others it is a terpsichorean drama for two performers, in which all the emotions excited by love are represented by gestures and cries.

Jig'ger, the corrupt current form of "chigoe," the South American name of a small arachnid, or red bug (*Sarcopsylla penetrans*), which abounds in tropical America, and is troublesome by working its way under the skin, especially of the feet, where, unless speedily removed, it produces eggs and forms a bad sore.

Jihad, ji-häd', **Jehad**, or **Tihad** (Arab. "zeal, endeavor") the term applied to the religious war, as undertaken by Mohammedans against those who did not believe in the mission of the Prophet, for the purpose of promoting the spread of Islam. The Jihad was a religious duty, imposed upon the faithful both by the Koran and the concurrence of sacred tradition. Its purpose was ostensibly the Mohammedanization of the unbelieving, and it was carried on in a systematic manner. The disposition of the peoples conquered in the Jihad was prescribed by law. Captives and others who fell into the hands of the Mohammedan hosts had the choice of three things given them. Either they were to deny their own faith and accept that of Islam, or to consent to pay a poll tax to their conquerors. If they refused both of these alternatives they were put to death by the sword. Consult: Baillie, 'Of Jihad in Mohammedan Law' (1871); T. T. Hughes, 'Dictionary of Islam' (1886).

Jihson. See **Oxus**.

Jim'son-weed. See **DATURA**.

Jingal, jing'gäl, a large heavy musket used in eastern Asia, especially by the Chinese. It is fired on a rest, or swivel, from a wall, or the bulwark of a boat or ship.

Jingo, a word first used as a political term in the Russo-Turkish War of 1877-8, and was applied to a class of British politicians who continually urged on Disraeli, then the prime minister, the necessity of taking sides with the Turks. The word was adopted from "McDermott's War Song"—that is, the song sung in music halls by McDermott and very popular at the time. The chorus ran thus:

We don't want to fight, but, by Jingo! if we do,
We've got the ships, we've got the men, we've got the money, too.

Since the Spanish-American War, and the conquest of the Philippines, the word has been used in the United States as meaning one who advocates a spirited and aggressive foreign policy.

Jinn, jin, in Mohammedan mythology, a race of genii, angels, or demons, fabled to have been created several thousand years before Adam. They are not immortal; they are to survive mankind, but to die before the general resurrection. Some are good and obedient to the will of God; others are disobedient and malignant. They can assume the shape of lower animals, and are visible or invisible as they please. Their chief residence is the mountain Kâf in Arabia. The jinn are frequently introduced in the 'Arabian Nights,' and one of Victor Hugo's most effective poems is entitled 'Les Djinns.'

Jinrikisha, jin-rík'ishä ("man-power vehicle"), a two-wheeled carriage, resembling a gig, and drawn by a human runner between the shafts, universally used in Japan since 1868.

Joab, jo'äb, the son of King David's sister Zeruiah, and commander-in-chief of David's army. He is first mentioned as the leader of David's men in an expedition against Abner. When Joab treacherously murdered Abner in revenge for the death of Asahel, David dared not punish the deed, and thus showed the ascendancy which Joab had acquired over him. After David had been established king in Jerusalem, Joab conducted all his wars with uniform success. He remained faithful to him during the rebellion of Absalom. When he had slain that ungrateful son, David made a weak attempt to supersede him in favor of Amasa, the general of Absalom. Joab slew Amasa and resumed his post, a proceeding in which the king tacitly acquiesced. He further supported David by assisting in the murder of Uriah the Hittite. Toward the close of David's reign he joined in the rebellion of Adonijah, for which Solomon, by the advice of David, put him to death. He was an able leader and astute statesman, and when his own ambition did not interfere gave many proofs of steadfastness and moderation.

Joachim, yo'ä-Him, **Joseph**, Hungarian violinist: b. Kittsee, near Presburg, 28 June 1831. He studied under Szervaczinsky, the opera concert-meister at Budapest, with Böhm at Vienna, and Hauptmann at the Vienna Conservatory, and after appearances in concert, continued his studies at Leipsic. In 1849 he became concert-meister of the Weimar grand-ducal orchestra, of which Liszt was then conductor, in 1854-66 was solo-violinist and conductor of concerts to the king of Hanover, and in 1868 became director of the Hochschule für ausübende Tonkunst at Berlin. He became known, both

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as an interpreter of the best music and as an executant, as the greatest violinist of his time, and particularly as a quartette player gained an almost classic reputation. His compositions include the 'Hungarian Concerto' in D-minor for violin and orchestra, his most important work; ballads, trios, overtures, marches, and works for violin and pianoforte.

Joachim, jō'a-kim, Saint, Order of, an order of knighthood founded 20 June 1755, under the title "Order of Jonathan for the purpose of defending the honor of Divine Providence." It consisted of 14 dukes, princes, counts and nobles, and its grandmaster was Prince Franz Christian of Saxe-Coburg. Its object was by the establishment of commanderies to stir up the rich to philanthropic work among the lower classes. This order was still in existence in 1820, but it has since then been dissolved.

Joan (jo-ān or jōn) of Arc (JEANNE D'ARC—properly DARC), the Maid of Orleans, heroine in French history: b. Domrémy, Basse Lorraine, now department of the Vosges, 6 Jan. 1412; d. Rouen 30 May 1431. While she was still a girl she began to be deeply affected by the woes of her country, much of which was conquered by the English and their Burgundian allies, leaving only a small portion to the French king, Charles VII. From about 13 she declared she heard heavenly voices, which at last became very definite in their commands to go to the aid of Charles and liberate France. At first she was regarded as insane, but eventually she found her way to the king and his councilors, and having persuaded them of her sincerity, received permission to hasten with Dunois to the deliverance of Orleans. In a male dress, fully armed, she bore the sword and the sacred banner, as the signal of victory, at the head of the army. The first enterprise was successful. With 10,000 men she marched from Blois, and on 29 April 1429 reached Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their intrenchments, and Suffolk abandoned the siege (8 May 1429). Other successes followed; Charles entered Rheims in triumph; and at the anointing and coronation of the king, 17 July, Joan stood at his side. She then asked to be allowed to return home, but at the urgent request of King Charles, remained with the army. She was later less successful and failed to capture Paris. On 24 May 1430 she entered Compiègne, then besieged by the Burgundians, and on the same day, in a sally from the town, was taken prisoner. Subsequently she was delivered to the English, who, with the University of Paris and the bishop of Beauvais, demanded her execution as a sorceress. She was taken to Rouen, and after a long mock-trial, accompanied with many shameful circumstances, condemned to death. On submitting to the church, however, and declaring her revelations to be the work of Satan, her punishment was commuted to perpetual imprisonment. But pretexts were soon found to treat her as a relapsed criminal, and as such she was burned at Rouen, and her ashes were thrown into the Seine. She died with undaunted fortitude. Her recantation is now doubted by some historians. Voltaire, in a notorious burlesque, 'La Pucelle,' Southe, Schiller, and others have made her the subject of their verse. Schiller's drama, 'Die Jungfrau von Orleans,' still remains the worthiest monu-

ment of her fame. A revision of the trial was later had, and she was declared innocent (1456). From 1875 the question of her canonization was discussed at Rome, and in 1902 she had been pronounced "venerable." Consult: Quicherat, 'Condamnation et Rehabilitation de Jeanne Darc' (1841-9); Marin, 'Jeanne Darc, Tacticien et Stratégiste' (1891); Oliphant, 'Jeanne d'Arc' (1896); Murray, 'Jeanne d'Arc' (1902).

Joan of Arc, Personal Recollections of, a historical novel by "Mark Twain" (S. L. Clemens), published in 1896. It professes to be a translation by Jean François Alden from the ancient French of the original unpublished MS. in the national archives of France, written by the Sieur Louis de Conte, her page and secretary. The historical facts are closely followed.

Job, jōb, Book of, title of a book in the Old Testament, so called from the man whose history it relates. It cannot be ascertained with certainty when the book was produced. Job himself belongs to the patriarchal age, but the book was written at a period when great calamities had fallen upon the people of God, and they had been driven by bitter experience to consider the nature and object of His providential workings. It is probably later than Jeremiah (626 B.C.) or Habakkuk (604 B.C.), both of whom had paid some attention to this problem.

The prologue (ch. i. ii.) is written in prose. Satan is permitted to test Job's trust in God, and the patriarch is suddenly stripped of his possessions and bereaved of his children. Yet Job ascribes no wrong to God. He himself is smitten with deadly leprosy. Job's three friends came to see him and he bursts into a despairing cry for death.

The debate between Job and his three friends (ch. iv.-xxxii.) is written in poetry. These friends attribute Job's affliction to his sin and hypocrisy. They are answered by Job's self-vindication; he adjures God to reveal the cause of his chastisement. In the speech of Elihu, a youth, who has listened to the debate, the goodness of God is asserted. He afflicts men to deter them from sin.

Then the Lord speaks out of the whirlwind (ch. xxxviii.-xlii. 6) and shows his power as Creator and Preserver of all things in the material world. Job answers, "I have heard of Thee with the hearing of the ear, but now mine eyes see Thee." The epilogue is in prose. Job is restored to health and prosperity.

The meaning of the book seems to be, that suffering or calamity is not a proof of guilt in the sufferers; the ways of God are so high, His power so vast in creation, in the government of nations and in the realm of mind, that man is incapable of gauging His methods of overruling human life.

Job's Tears, a stout grass (*Coix lachryma-jobi*), allied to maize, and which is sometimes seen six or eight feet in height. It is a native of southern Asia, is naturalized in Spain, and in other countries is sometimes grown in hot-houses. The hard, round, shining seed-capsules, from whose fanciful resemblance to tears the plant derives its name, are used in making rosaries and ornamental articles, as medicine by the Chinese, and as a staple food among some of

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the hill-tribes of northern India. See also, GRASSES IN THE UNITED STATES.

Jocelyn, jōs'ē-lin, Ada Maria Jenyns, English novelist: b. Aldershot, Hampshire, 7 Sept. 1860. She was married to Colonel R. J. O. Jocelyn in 1892. Among her numerous fictions may be mentioned 'A Distracting Guest' (1889); 'Only a Horse Dealer' (1892); 'Pamela's Honeymoon' (1894); 'Lady Mary's Experiences' (1897); 'The Seat of Fortune' (1901).

Jocelyn, Nathaniel, American portrait painter: b. New Haven, Conn., 31 Jan. 1796; d. there 13 Jan. 1881. At 18 he was apprenticed to an engraver, but after three years his early love for painting asserted itself and he established himself as a portrait painter at New Haven in 1820. He was for some time resident in Savannah, where he painted many portraits, but returned to his native town where his work was very popular and where from 1825 to 1835 he painted the portraits of many notables, not a few of which are preserved in Alumni Hall at Yale. His fame extended beyond the limits of his State and he exhibited at the Academy of Design on several occasions. At the age of 80 he painted 'Ocean Breezes,' a successful work of fancy, and his only one. His portraits have been greatly prized by critics. Jocelyn was a staunch anti-slavery man, and his home in New Haven was long one of the stations on the Underground Railroad. He was for many years the senior partner of a bank-note engraving company in New York which subsequently became the American Bank Note Company, resigning from the latter in 1867.

Joe Miller, the name attached to a well known collection of jests, first published in 1739. The name belonged to a comic actor, Joseph Miller (1684-1738), who had then a great reputation as a wit and humorist. The real compiler, however, was a certain John Mottley, an obscure author (1692-1750). The term is now often applied to any stale or worn out jest.

Joe Pye Weed. See EUPATORIUM.

Joel, jō'ēl, one of the minor prophets. He most probably flourished about 770 B.C., a few years before Amos and Hosea, whose writings have many correspondences with his. Joel's prophecy is full of Oriental symbolism, and is pervaded by a tone of solemn warning. He announces what he calls "a day of Jehovah," that is, a day of judgment and vengeance for Judah and Jerusalem. This is typified by a plague of locusts whose devastations are vividly described. The prophet appeals to the people to meet the impending judgment by prayer and fasting. Jehovah himself is represented as giving his answer to the cry for help; relief from famine, abundant rain, rich harvests are to bring relief. Moreover a new spirit is to be poured out upon the people so that in the day of trial they shall call upon God and be saved. The people of Jehovah sold into captivity by Phoenicians and Philistines are to be restored. The nations are to be called to judgment, and in that fearful day Jerusalem shall find refuge in Jehovah. The style of the prophet is gorgeous in its profusion of imagery; metaphor and hyperbole have to be interpreted, and fact discerned amid the maze of fancy. Yet the lan-

guage is smooth and flowing without the strain and abruptness of Hosea and Jeremiah, and we are compelled to look upon Joel as a man of calm and settled mind, without any of the doubts and struggles that racked the minds of other Hebrew poets and prophets.

Jogues, zhōg, Isaac, French missionary among the North American Indians: b. Orleans 10 Jan. 1607; d. Ossernenon, near the present Awnesville, Montgomery County, N.Y., 18 Oct. 1646. He became a Jesuit at Rouen in 1624, and, after some years passed in study and teaching, was ordained in 1636. At his own request he was immediately sent to the Huron mission in Canada. In 1639 he undertook a mission to the Tobacco Nation, in 1641 preached to the Algonquins at Sault Sainte Marie, not long after went to Three Rivers for supplies for the Huron Mission, and upon his return was captured by the Mohawks and severely tortured. He remained among the Indians as a slave, until the summer of 1643, when he made his escape to the Dutch settlement of Rensselaerswyck (Albany), and was conveyed thence to New Amsterdam. He finally reached France, where he was treated with great consideration, and invited to court. Returning to Canada, he traveled to the Mohawk country in May 1646, in the capacity of an ambassador to conclude a treaty between that people and the French. Ascending the Sorel, he passed through Lake Champlain and Lake George, which he named Lac Saint Sacrement. Having ratified the peace he returned to Quebec, and after a few days rest set out for the Mohawks again, this time as the founder of the Mission of the Martyrs. He was soon tortured as a sorcerer, and finally killed. Consult: Martin, trans. by Shea, 'Father Isaac Jogues' (1896); Parkman, 'The Jesuits in North America' (new ed. 1898).

Johannesburg, yō-hän'nēs-boorg or jō-hän'nēs-berg, South Africa, the metropolis of the Transvaal Colony, situated 5,500 feet above the sea, about 30 miles southwest of Pretoria, with which and with Delagoa Bay 397 miles, Durban 483 miles, East London 668 miles, Port Elizabeth 715 miles, and Cape Town 1,015 miles, it is in railway communication. It is the recognized business centre of the rich gold fields of the Witwatersrand, and the largest town in the Transvaal. In 1886 it was represented by a few shanties, but the discovery of gold and the development of gold mining made it within a comparatively few years one of the most important towns of South Africa. Municipal government was conferred upon the city by the Transvaal authorities in 1896, when the population within a three-mile radius was 102,078, of whom 50,907 were whites, 67 per cent of these being of British origin, while the Boer citizens numbered 6,205. The great Uitlander agitation which culminated in the Transvaal war 1899-1902, centred in Johannesburg, which was occupied by Lord Roberts in 1900. Since the close of the war, important public improvements to cost \$30,000,000 have been begun. These include many miles of well-paved streets, an elaborate electric car system, new waterworks, sanitation system, a factory section, and handsome suburbs. Mementoes of the former Boer rule are an imposing but dismantled

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fortress which dominates the town, and the monument near Krugersdorp which commemorates the declaration of Boer independence in 1880. Among the notable buildings and institutions are: many fine hotels, clubs, etc.; a handsome railway station lighted by electricity; the market buildings, in the large Market Square, where also are the post and telegraph offices and the buildings of the chamber of mines; the fine public library building; the stock exchange; the court-house; many churches; a synagogue; a good hospital; a jail and a police barracks, and a new theatre and opera house. The town is lighted partly by gas but mainly by electricity.

In 1903 there were 160 incorporated mining companies employing 40,000 natives. Prior to the war 96,000 natives were working in the mines; 124 of the mining claims are located on the main reef and the others in the neighborhood of Klerksdorp. Prior to the war the gold production was valued at \$7,000,000 a month, and the machinery employed was estimated at \$100,000,000. The industry is fast recovering itself, and it is estimated that within a few years the annual production of gold will be equal to \$121,500,000. The international peace exhibition of South Africa, to be held at Johannesburg 1904-5, is expected to fully rehabilitate commercial interests, and it is predicted that within six years Johannesburg will have a population of 200,000.

John, the name of 23 popes, as follows:

John I., Saint: b. Tuscany; d. 526. He succeeded Hormisdas in 523, and was a friend of Boethius, who dedicated to him several of his works. Theodoric sent him to Constantinople, to induce the Emperor Justin to adopt milder measures toward the Arians. Though received with uncommon pomp, his mission was fruitless, and on his return Theodoric threw him and his companions into prison, where he died. He is commemorated by the Roman Catholic Church 27 May.

John II. (MERCURIUS, mér-kū'ri-üs): d. Rome 27 May 535. He was a Roman and was surnamed Mercurius by reason of his eloquence. He became pope in 532.

John III.: d. Rome 12 July, 572. He was a Roman and became pope in July 560. During his time the Lombards frequently ravaged Italy.

John IV.: b. Salona in Dalmatia; d. Rome 11 Oct. 642. He was elevated to the papal chair in December 640 and was noted for zeal and orthodoxy. He formally condemned the Monothelite statement of faith which Sergius had drawn up at the desire of the Emperor Heraclius.

John V.: b. Antioch, Syria; d. Rome 2 Aug. 686. He was the earliest of several pontiffs of Oriental origin and had been sent to the sixth General Council by Pope Agatho as legate. He became pope, 24 July 685.

John VI., he was a Greek by birth; d. Rome 9 Jan. 705. He became pope in 701, and when appealed to with reference to the long dispute between Saint Wilfred of York and the archiepiscopal see of Canterbury, decided in favor of the latter.

John VII., a Greek: d. Rome 17 Oct. 707. He became pope 1 March 705.

John VIII., a Roman: d. Rome 15 Dec. 882. He became pope in 872. The Saracens during his pontificate pushed their ravages to the gates of Rome, and he was compelled in 877 to pay them tribute. He crowned three emperors, Charles the Bald, 875; Louis the Stammerer, 878; and Charles the Fat, 881. He attempted, but unsuccessfully, to unite the Greek and Latin churches.

John IX.: b. Tibur; d. May 900. He belonged to the Benedictine order and became pope, as the choice of the Frankish party, in June 898.

John X.: b. Romagna; d. July 929. He was a man of great ability and of virtuous character notwithstanding the aspersions Liutprand casts upon him. He was archbishop of Ravenna in 905 and became pope in 914. He placed himself at the head of an army and drove the Saracens from Italy, but his determination to rule independently of any faction aroused the anger of his opponents and he was imprisoned, and at length murdered, by Theodora's daughter, Marozia, whose ambitions he had thwarted.

John XI.: b. 906; d. 936. He was the son of Marozia (q.v.) and Guy, duke of Spoleto. He was elected pope while under age in 931, and governed through the influence of his mother. His brother Alberic II. revolted and imprisoned the pope and his mother in the castle of San Angelo, where John died.

John XII. (OCTAVIAN): d. Rome 14 May 964. He was the son of Alberic and grandson of Marozia. He became pope in 956, after the death of Agapetus II., though only 18, and was the first pope who changed his name on accession to the papal dignity. He applied to the emperor Otho I. for assistance against Berengarius II., crowned the emperor 962, and swore allegiance to him, but soon after revolted against Otho, who caused him to be deposed by a council, in 963, and Leo VIII. to be elected. On Otho's death, in 964, John returned and excommunicated his rival.

John XIII., a Roman: d. Rome 6 Sept. 972. He was bishop of Narni, was made pope in 965 by the influence of the emperor Otho I., and was expelled by the Roman nobles. Otho II. restored him to Rome, and was crowned by him. The Poles and Hungarians were converted during his pontificate.

John XIV. (PETER): b. Pavia; d. Rome 20 Aug. 984. He was bishop of Pavia and had been chancellor to Otho II. who made him pope in November 983, in place of the anti-pope Boniface VII. The latter had seized the papacy after the death of Otho I. Boniface now returned from Constantinople and imprisoned John in the castle of San Angelo, where he died soon after.

John XV.: d. Rome April 996. He did not reach the blood-stained throne of his predecessor. He died within the month of his election, even before his consecration.

John XVI. (PHILAG'ATHUS), a Greek of Calabria: d. 996. He became pope in 986. He solemnly canonized St. Udalric, bishop of

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Augsburg. This is the first historical mention we find of a solemn pontifical canonization.

John XVII. (*Sic'co*): b. Ripa Jani; d. Rome 7 Dec. 1003. An anti-pope intruded during the pontificate of Gregory V.

John XVIII. (*Phasianus*, *fa-sē-ā'nūs*). He became pope on Christmas Day 1003, and in May 1009, resigned his office and entered a monastery.

John XIX., a Roman: d. January 1033. He succeeded his brother Benedict VIII. He was disposed to concede the title Ecumenical to the Patriarch of Constantinople, but this met with so much opposition from the Latin Church that he was obliged to withdraw the concession.

John XX., frequently called **John XXI.** (*Pedro*, *pā'drō*): b. Lisbon, Portugal; d. Viterbo, Italy, 20 May 1277. He became in 1273 cardinal-bishop of Frascati and pope in September 1276. He was learned in philosophy and medicine and wrote several treatises still of interest as showing the status of mediæval medicine.

John XXI. See **JOHN XX.**

John XXII. (*Jacques D'Euse*, *zhāk dēs*): b. Cahors about 1244; d. Avignon 4 Dec. 1334. He was archbishop of Avignon, and was elected pope at Lyons 1316, after the death of Clement V. He resided at Avignon, but had many adherents in Italy. He is important in German history on account of the active part he took in the disputes of the emperors Louis of Bavaria and Frederick of Austria. Louis intruded the anti-pope Nicholas V. and declared John XXII. deposed. Several theological controversies filled his pontificate with ecclesiastical strife, the most notable being the question of absolute Evangelical poverty raised by the Franciscans and that of nominalism led by William Ockam. He published in 1317 the 'Constitutions of Clement V.', a manual of canon law, since known by the title 'Clementines' (q.v.). He was also the author of the decretals called 'Extravagantes.' See **CANON LAW**.

John XXIII. (*Baldassare Cossa*, *bāl-dā-sā'rā kōs'sā*): b. Naples; d. Florence 22 Dec. 1419. He was elected pope in 1410, by the Council of Pisa, after the death of Alexander V., on condition that, if Gregory XII. and Benedict XIII. would resign, he would also retire to end the schism. He summoned the Council of Constance, demanded by the Emperor Sigismund, in 1415, where he confirmed his resignation 2 March; but 20 March he fled secretly from Constance to Schaffhausen, and revoked his resignation. He was cited before the council, but not appearing, he was suspended, and finally deposed. He was imprisoned four years. Pope Martin V. subsequently pardoned him and made him cardinal bishop of Tuscoli, and dean of the college of cardinals.

John, king of England: b. Oxford 24 Dec. 1166; d. Newark, Nottinghamshire, 19 Oct. 1216. He was the youngest son of Henry II., by Eleanor of Aquitaine. Being left without any particular provision he received the name of *Sans Terre* or Lackland; but his brother, Richard I., on his accession conferred large possessions on him. He obtained the crown on the death of Richard in 1199, although the

French provinces of Anjou, Touraine, and Maine declared for his nephew, Arthur of Brittany, who was lineally the rightful heir, then with the king of France. A war ensued, in which John recovered the revolted provinces and received homage from Arthur. In 1201 disturbances again broke out in France, and Arthur, who had joined the malcontents, was captured and confined in the castle of Rouen, and never heard of more. John was universally suspected of his nephew's death, and in the war which followed, he lost Normandy, Anjou, Maine, and Touraine. In 1205 his quarrel with the pope began regarding the election to the see of Canterbury, to which the pope had nominated Stephen Langton. The result was that Innocent III. laid the whole kingdom under an interdict, and 1211 issued a bull deposing John. Thereupon John made abject submission to the pope, even agreeing to hold his kingdom as a vassal of the pope (1213). His arbitrary proceedings led to a rising of his nobles, and he was compelled to sign the Magna Charta or Great Charter 15 June 1215. But he did not mean to keep the agreement, and obtaining a bull from the pope annulling the charter, raised an army of mercenaries and commenced war. The barons, in despair, offered the crown of England to the dauphin Louis, who accordingly landed at Sandwich 30 May 1216, and was received as lawful sovereign. The issue was still doubtful when John died. Consult: Stubbs, 'Constitutional History of England,' Vol. I.; Norgate, 'England under the Angevin Kings' (1887), and 'John Lackland' (1902).

John II., king of France, surnamed the "Good": b. about 1319; d. London 8 April 1364. He was the son of Philip VI. and was a monarch distinguished alike for his incapacity and his misfortunes. In 1356 he was defeated and taken prisoner by the Black Prince at the battle of Poitiers, and detained at Bordeaux and at London till released at a heavy expense to his country by the Peace of Brétigny in 1360. On learning that his son, the duke of Anjou, who had been left as a hostage in England, had effected his escape, he returned to London, where he died.

John III. (*Sobieski*), king of Poland: b. Olesko, Galicia, 2 June 1624; d. 17 June 1696. John Casimir appointed him standard-bearer to the crown, and he distinguished himself in the war against the Russians and Swedes, which terminated with the Peace of Oliva in 1660. In 1669 Michael Koribut was chosen king on the resignation of John Casimir against a party who preferred Sobieski. On the death of Michael he was chosen king, 21 May 1674. A new war with the Turks was concluded after varying success by a peace, 27 Oct. 1676. The anarchy in which Poland was constantly kept by the turbulence of its aristocracy was aggravated during the reign of Sobieski by the intrigues of his wife, and his own talent for administration was not equal to his capacity as a general. Besides internal troubles, European politics at this time occupied the attention of Sobieski, whose alliance was solicited both by Louis XIV. and the emperor. He at length concluded (31 March 1683) an alliance with the latter against the Turks, who had allied themselves with the

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malcontents in Hungary and threatened a most formidable invasion of the empire. Uniting with the Austrian forces 9 September, at the head of a combined force of 83,000 men, he inflicted a decisive defeat on the Turks, and compelled them to raise the siege of Vienna, 12 Sept. 1683. He terminated the campaign with the capture of Gran (27 October), which had been in the possession of the Turks for nearly a century and a half. In 1686 he overran Moldavia and Wallachia, but failed to make a permanent conquest.

John of Austria, commonly called **Don John of Austria**, Spanish general: b. Ratisbon, Bavaria, 24 Feb. 1547; d. near Namur, Belgium, 1 Oct. 1578. He was an illegitimate son of the emperor Charles V. In 1570 he conducted a campaign against the Moors of Granada with great vigor and relentlessness, and in the following year commanded the allied fleet which won the great naval battle of Lepanto over the Turks (7 Oct. 1571). In 1576 he was appointed governor of the Netherlands, and had won with the Prince of Parma the victory of Gembloux (1578) over William the Silent, when he died, not without suspicion of having been poisoned by his jealous half-brother, Philip II., but for this belief there is no evidence. Consult: Motley, 'The United Netherlands'; Stirling-Maxwell, 'Don John of Austria' (1883).

John of Gaunt, gānt or gānt, **DUKE OF LANCASTER**, English soldier: b. Ghent, Flanders, (whence his name) 1340; d. London 3 Feb. 1399. He was the fourth son of Edward III. and his queen, Philippa of Hainaut. He was created Duke of Lancaster in 1362; served in the French wars, and became governor of Guienne. He assumed in right of his wife the title of King of Castile, invaded that kingdom to assert his claims, but relinquished them in favor of Prince Henry of Castile, his son-in-law. He was a supporter of the reformer John Wyclif, and a patron of the poet Chaucer. Shakespeare introduces him as a prominent figure in the play of 'Richard II.' His eldest son, Bolingbroke, became king of England as Henry IV. Consult: Longman, 'Life and Times of Edward III.' (1869); Trevelyan, 'England in the Age of Wycliffe' (2d ed. 1899).

John of Leyden, lī'dēn. See **ANABAPTISTS**.

John, Epistles of, three letters upon Christian doctrine and conduct attributed to Saint John the Divine, the fourth Evangelist.

The First Epistle of Saint John.—This epistle was attributed to the apostle and evangelist by writers of the generation succeeding that in which he lived. Its thought, diction and style are those of the fourth gospel, though nothing indicates whether it was written before or after that book. Its date cannot be earlier than 90 A.D. nor later than 100 A.D. Critics generally agree that it was written from Ephesus. It was addressed to certain Christians of Ephesus and its vicinity who had fallen into error. These were *Docetæ* (q.v.) and failed therefore to reach true fellowship in Christ. The apostle presents Jesus as Christ and shows that we come into fellowship with God through Him, and inculcates faith in a real Redeemer, as a means of crushing the practical error whose result was barrenness in religion.

The book is a pastoral letter of instruction and exhortation, not a theological tract or a commentary on the Gospel. The purpose is set forth in chapter v. 13. The epistle falls into three main divisions: (1) God is light (i. 5–ii. 28), (2) God is righteous, or God is love (ii. 29–v. 5), (3) Jesus is the Son of God; fellowship with God comes through him. Sometimes the second division is subdivided under the headings (1) God is love, (2) God is righteous. But the writer evidently intends these two truths to stand as different aspects of the same truth, for as the love of God springs from his righteousness so his righteousness is the outcome of his love.

The Second Epistle of Saint John.—All evidence conclusively points to the apostle Saint John as author of this epistle. It is directed "to the elect lady and her children," who must have been an individual Christian woman; other views are attended with grave grammatical difficulties, whether we translate it to "the lady Elect" or "the elect Kyria." Her name is in fact unknown. The apostle had been met by some of her children and had rejoiced in their conduct, but warns them against defection.

The letter opens with a greeting; expresses joy in her sons' behavior (verse 4); exhorts all to abound in love (verses 5, 6); warns against deceivers (verses 7, 8), in closing the writer expresses a hope of visiting her, and delivers her sister's greeting.

The Third Epistle of Saint John.—It is addressed to Gaius, who cannot be identified with any person of that name mentioned in the New Testament (Acts xix. 29; xx. 4; Rom. xvi. 23; 1 Cor. i. 14). He lived near Ephesus, and was hospitable to the preachers sent by the apostle (verses 2–4). The character of Diotrephes (verses 9–11) Demetrius, who probably bore the letter is commended (verse 12). A vivid glimpse of church life at the close of the 1st century is given in these letters which reveal the Church in Asia Minor infected with speculative error, personal ambition, and insubordination to apostolic authority, and points to opposition which local leaders sometimes exhibited toward the delegates of the central authorities.

John, Order of Saint, a military religious order of mediæval origin. The Knights Hospitallers of Saint John, subsequently known as Knights of Rhodes, and lastly as Knights of Malta, were once a great power in Christian Europe. The origin of the order is unknown, but most probably it was early in its history that a rich merchant of Amalfi built not far from the Holy Sepulchre at Jerusalem a certain church known as Santa Maria della Latina, with a monastery for monks, under the rule of Saint Benedict, and a hospital for pilgrims. The first patron of the order seems to have been Saint John the Compassionate, patriarch of Alexandria in the 7th century. Afterward Saint John the Baptist was chosen patron, and the Benedictine brethren assumed the title of Johannites, or Brothers Hospitallers of Saint John. Pope Paschal II. in 1113 gave them the privilege of electing their own rector. Later, in addition to the vow of poverty, chastity and obedience they were pledged to make war upon the infidels, and assumed a black cloak with a white cross on the left side. The members were divided

JOHN—JOHN DORY

into three classes, knights of noble birth, the fighting class, priests bound to the service of the church, and brethren of service who took care of the sick and acted as guides to the pilgrims. In 1291 the order was driven from Palestine by the conquests of the Saracens, and after holding Cyprus for a time they occupied Rhodes in 1309, from which they were ultimately driven by Sultan Soliman II. in 1522. After that the knights retired to Candia and other places, but finally to Malta, which Charles V. granted them in 1530. Here they continued to be a bulwark of western Europe against the Turkish navies till modern times. The chief of this order, which had great possessions in almost every part of Europe, was called "Grandmaster of the Holy Hospital of St. John of Jerusalem, and Guardian of the Army of Jesus Christ." He lived at Valetta, in the island of Malta.

The military duty of the knights consisted in taking the field at least three times against the Turks or the pirates of Barbary. In war they wore a red jacket or tabard, charged with a white cross. In 1798 Malta was unexpectedly attacked and taken by Bonaparte, and about the same time the extensive properties belonging to the order in various countries were confiscated. This may be considered the end of the order as a vital institution, although shortly after the capture of Malta, Paul I., who had been chosen grand-master, took the order under his protection, and it still exists nominally at least. After the death of Paul the nomination of the head of the order was vested in the pope.

John, yōn, Eugenie, "E. MARLITT," German novelist: b. Arnstadt, Thuringia, Germany, 5 Dec. 1825; d. there 22 June 1887. She was the daughter of a portrait painter, and after pursuing the study of music at Vienna, lived at court for some years. She then returned to her native town and took up novel writing, using the pseudonym of "E. Marlitt." Her works, which are very numerous, have been translated into English by Mrs. A. L. Wistar, and have been very popular in this country. Among them are 'Gold Elsie' (1868); 'Old Mamselle's Secret' (1868); 'Countess Gisela' (1870); 'Princess of the Moor' (1872); 'The Second Wife' (1874); 'In the Counselor's House.'

John, Saint, Gospel of. See GOSPELS.

John B. Stetson University, a coeducational school founded in 1883, at De Land, Fla., under the auspices of the Baptist denomination. The institution was first called De Land University, but in honor of John Batterson Stetson (q.v.), who has given large gifts to the institution, nearly all of the buildings and the campus, the name has been changed. The departments are a preparatory, schools of music, law, art, and technology, a normal and practice school for teachers, a business college, and a college of liberal arts. The courses lead to the degrees of bachelor of arts, laws, and philosophy, and to degrees of bachelor of civil, electrical, and mechanical engineering. The school in 1898 made arrangements with the University of Chicago, whereby the graduates of the college of liberal arts, who have a high standing in their studies, may receive corresponding degrees from

the Chicago institution. In 1902 the number of students in attendance was nearly 450, the number of professors and instructors 40. The endowment fund amounted to about \$210,500.

John Baptist, the forerunner of the Messiah and the Elijah, or Elias of the New Testament. About five years before the Christian era the Angel Gabriel, according to St. Luke's Gospel, appeared to the aged priest Zacharias and announced the birth of John by Elizabeth, the priest's wife. John was to be filled with the Holy Ghost and to go before the Lord in the spirit and power of Elisha to prepare a people for Him. This was some months before the angel announced in Nazareth, to a maiden called Mary that she should bear a son, whose name was to be Jesus, "the son of God." John Baptist, born 5 B.C. spent his early manhood in the desert. He announced the coming Messiah, and preached repentance, baptizing as a symbolic rite of purification and pardon. He was naturally the first publicly to recognize Jesus Christ and salute him as the "Lamb of God." Herod Antipas (q.v.) then ruled Palestine, his throne being under the protection of Augustus, and he imprisoned the Baptist in the gloomy fortress of Machaerus, east of the Dead Sea, being offended by the plain speaking of the stern ascetic. At a birthday feast given to his Galilean nobles Herod was fascinated by the dancing of Salome, the daughter of Herodias, the wife of his brother Philip, whom he had taken to wife, although her lawful husband still survived. The rebuke administered to Herod for his adultery by John had incensed Herodias and she was bent on vengeance. When Antipas swore to give Salome whatever she might ask to the half of his kingdom, she at her mother's suggestion, asked for the head of John Baptist on a charger or large dish. This was the occasion of the Baptist's martyrdom. The place where this incident happened was the Golden House of Tiberias, whose ruins are still pointed out as Kasr Bint-el-Melek, "Palace of the King's Daughter."

John Brown's Body, a famous marching song of the Civil War, the origin of which has for years been in dispute. It has been generally credited to C. S. Hall of Charleston, Mass. (1861). The words were applied to an old tune common in England in the 18th century.

John Bull, a name first used by the English humorist, Arbuthnot, and since popularized as a typical name suggesting a humorous or burlesque representation of the English character. He is represented as a bluff, jolly, bull-headed farmer.

John C. Green School of Science. See GREEN, J. C.

John Chrysostom. See CHRYSOSTOM, JOHN.

John Doe, a fictitious name given to unknown plaintiffs or defendants in law. In former times the name was applied to the fictitious lessee of the plaintiff in the mixed action of ejection, that of the fictitious defendant being "Richard Roe."

But if the lessor made out his title in a satisfactory manner, then judgment and a writ of possession were awarded to John Doe, the nominal plaintiff, who by this trial had proved the right of John Rogers, his supposed lessor.—Blackstone.

John Dory. A fish. See DORY.

JOHN HALIFAX — JOHNS HOPKINS UNIVERSITY

John Halifax, Gentleman, a novel by Dinah Maria Muloch Craik (1856), in which the hero, John Halifax, one of "nature's noblemen," beginning life as a poor boy, works his way up to prosperity and happiness, by means of his high principles, undaunted courage, and nobility of character. The heroine is Ursula March; and the simple domestic story includes few minor characters. The interest lies in the development of character: and the author's assertion is that true nobility is of the soul, and does not inhere in wealth, in learning, or in position; and that integrity and loftiness of purpose form the character of a true gentleman.

John Paw, a large and beautiful grouper (*Epinephelus Drummond-Hayi*), which is dark umber brown densely covered with small white pearly spots. It inhabits the Gulf of Mexico and is valued as a food fish in Florida. It is also known in the Bermudas, where it is called "speckled hind."

John Strange Winter. See STANNARD, HENRIETTA.

John Ward, Preacher, a novel by Margaret Deland, published in 1888. A Presbyterian minister named Ward, a logical Calvinist, is assured that belief in election and reprobation, eternal punishment, and kindred doctrines, is necessary to salvation; and so preaches them with force and conviction. While his congregation agrees with him, his wife entertains decidedly broad theological views in general. The couple love each other with that singleness of devotion without which the course of the story would be manifestly improbable; for it depends upon the question whether love will be able to hold together what conscientious habits of thought and ethical convictions tend to drive apart.

John's, Eve of Saint, the survival of a popular celebration of remote antiquity, held on the 23d of June, which in Christian times became the vigil or eve of the feast of the nativity of St. John Baptist, 24 June (Midsummer Day). On the eve of the feast it was the custom in former times to kindle fires called St. John's fires. This was indeed a continuance of those Teutonic and Scandinavian pagan festivals, which at the winter solstice were observed with Yule-fires, and at the summer solstice with similar beacon-fires, originally intended to communicate through the country the changes in the seasons announced by the priesthood, so as to direct the activities of agriculture and navigation. The burning of the Yule log at Christmas is a survival of these observances.

Johns Hopkins University, a university at Baltimore, Md., founded by Johns Hopkins, who was born in Maryland and amassed a fortune in Baltimore. He died in 1873 and bequeathed \$3,500,000 to found a university. Opened in 1876, it is now one of the foremost universities in the United States. The students are distinguished by the title of graduates and undergraduates, the former being such as have received a degree at this university or elsewhere, and who desire to carry their studies further, special attention being here given to the most advanced subjects, as well as to original research. The buildings of the university include

McCoy Hall, in which are the library, assembly room, and rooms appropriated to literary and historical studies; Levering Hall, the building of the Young Men's Christian Association; Hopkins Hall, equipped for the study of geology and mineralogy; a chemical laboratory; a biological laboratory; a physical laboratory; a gymnasium; an administration building; and four buildings for medical instruction.

In 1902 a large tract of land in the suburbs of the city, comprising 176 acres, was presented by several friends as a future site for the University, and it is expected that before many years it will be possible to remove the philosophical department thereto. This noteworthy gift was followed within a few months by a generous contribution, from alumni and citizens of Baltimore, of \$1,000,000 toward the permanent endowment of the institution.

Connected with the university is the Johns Hopkins Press, from which issue the 'American Journal of Mathematics'; 'The American Chemical Journal'; 'The American Journal of Philology'; 'Memoirs from the Biological Laboratory'; 'Studies in Historical and Political Science'; 'Journal of Experimental Medicine'; 'Beiträge zur Assyriologie'; 'Modern Language Notes'; 'Johns Hopkins University Circulars'; 'Terrestrial Magnetism and Atmospheric Electricity'; etc.

The degrees of Bachelor of Arts, Doctor of Philosophy, and Doctor of Medicine are conferred. Advanced and graduate students have elective courses, but each instructor has a discretion of his own with regard to admission to his classes. The university reported at the close of 1903: Professors and instructors, 147; students, 695; number of graduates, 1,535; volumes in the library, 115,000; productive funds, \$3,488,843; grounds and buildings valued at \$1,157,881; value of books and apparatus, \$350,000; income, \$250,454.

An important place at Johns Hopkins University has always been held by the "fellows." Twenty fellowships are awarded each year to the most promising among the many candidates, without preference of college; each fellowship is of the annual value of \$500, though it does not exempt from charges for tuition. In the language of the official announcement of the university, the fellowships are bestowed "almost exclusively on young men desirous of becoming teachers of science and literature, or proposing to devote their lives to special branches of learning which lie outside of the ordinary studies of the lawyer, the physician and the clergyman." The university also extends the privilege of "fellowships by courtesy" (without emolument) to certain individuals.

The university receives as students the following classes: (1) College graduates, who may proceed to the degree of doctor of philosophy, or may work for longer or shorter periods in the various seminaries or laboratories without reference to a degree. (2) Undergraduate students looking forward to the degree of bachelor of arts and following one of seven parallel groups of study. (3) Candidates for the degree of doctor of medicine, for whom a four-year course is provided, and who may be either men or women. (4) Doctors of medicine desiring to pursue certain special courses. (5) Students

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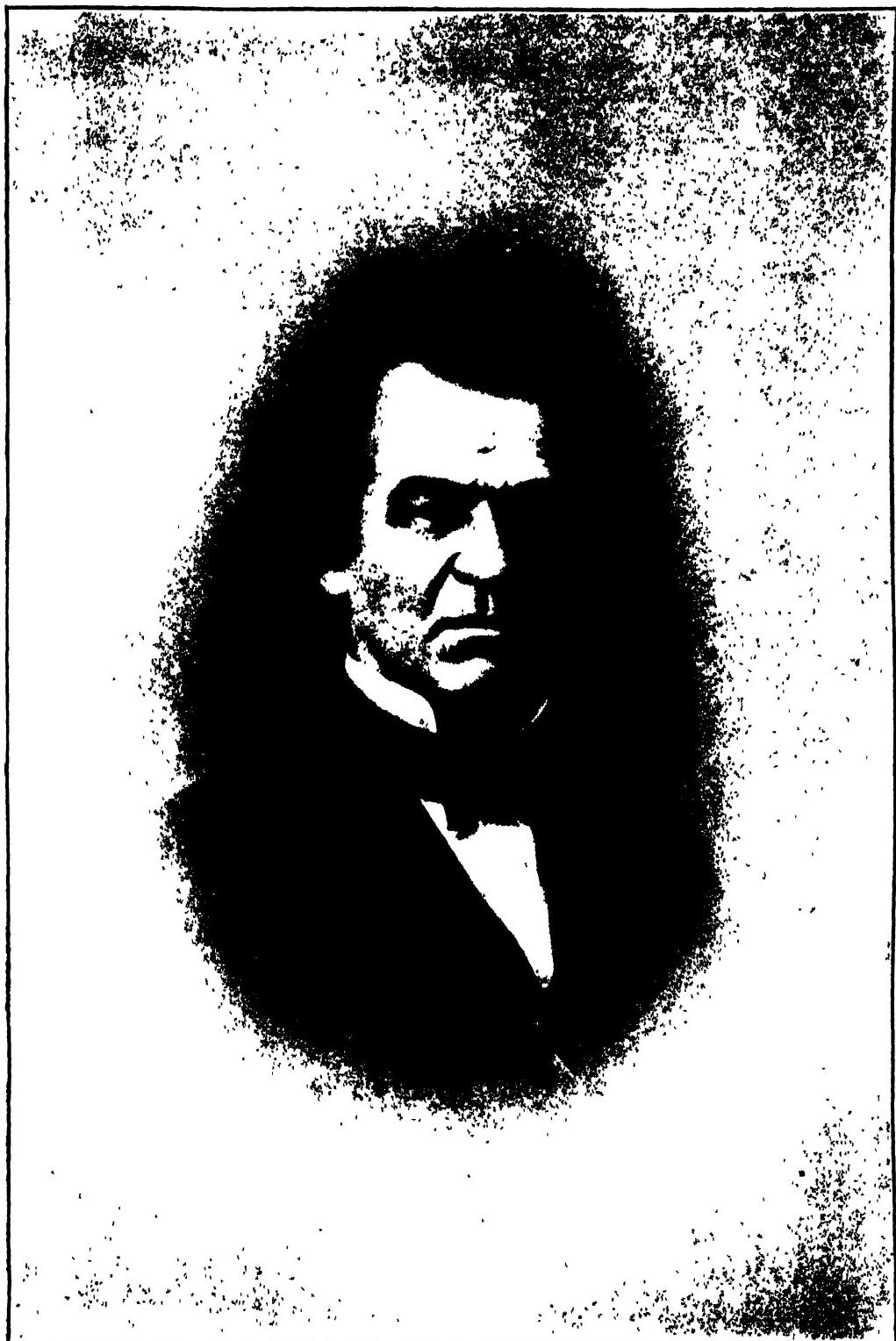
who have not taken a degree, and are not looking forward to a degree, but who desire to avail themselves for a brief period of the opportunities here offered. The courses of study under 1, 3 and 4 are entirely closed to those who are still candidates for a baccalaureate degree. The Johns Hopkins University, although giving little attention to applied science and technology, has been a very large factor in determining the character and methods of instruction to which these schools owe their success. It is impossible to overestimate its influence upon higher education in this country, and especially is this true in all things relating to science. There is scarcely an American college faculty that has not been enriched by the presence of one or more of its graduates, bringing with them at least something of the spirit of that institution, its respect for exact scholarship and regard for scientific truth.

Johnson, jön'són, Alvin Jewett, American publisher: b. Wallingford, Vt., 28 Sept. 1827; d. New York 22 April 1884. He worked on a farm, taught school in Virginia, went to New York in 1853, published 'Johnson's Illustrated Atlas,' a reconstruction of 'Colton's Atlas,' and thereafter several works, including 'Johnson's Universal Cyclopaedia,' now known in a revised form as 'The Universal Cyclopaedia.'

Johnson, Andrew, the 17th president of the United States: b. Raleigh, N. C., 29 Dec. 1808; d. near Carter's Station, Tenn., 31 July 1875. In 1810 he was apprenticed to a tailor at Raleigh, in 1824-6 worked as a journeyman at Laurens Court House, S. C., and then removed to Greenville, Tenn., where also he worked at his trade. At that time the State of Tennessee was controlled by the landed proprietors, who formed an aristocratic class. Johnson made himself the leader of an opposition or working-man's party, in 1828-30 was an alderman of Greenville, and in 1830-3 its mayor. In 1834 he was a leading advocate of the new State constitution, by means of which the power of the greater landholders was reduced. He was elected to the State legislature in 1835 and again in 1839, as a Democrat of the Jacksonian type. A Democratic elector for the State in 1840, he stumped effectively for the Van Buren ticket, and gained considerable reputation as an orator. In 1840 he was elected to the State senate from the counties of Greene and Hawkins, and during his term urged that the basis of representation should be the white vote without consideration of slave-ownership. In 1843 he was chosen to Congress, to which he was four times re-elected. While in the House he supported the restoration to General Jackson of the fine imposed upon him for the imprisonment of a judge at New Orleans in 1815; the annexation of Texas; the homestead law, distasteful to the Southern slaveholding class; the compromise of 1850; and the presidential veto-power. He was opposed to disregard of economy in the expenditure of public moneys. In 1853 he was elected governor of Tennessee, and in 1855 re-elected after a bitter campaign. He sat in the United States Senate in 1857-62, and there opposed the grant for the construction of a Pacific railway and strongly attacked secession. His vigorous Union attitude rendered him so unpopular in the South that he was several times burned in effigy, and upon

his return to Tennessee his life was endangered. Appointed military governor of the State, with rank of brigadier-general of volunteers, 4 March 1862, he displayed great prudence in the employment of his autocratic powers. On 6 June 1864 he was nominated Vice-President of the United States by the national Republican convention assembled at Baltimore, and, elected with Lincoln, entered on his office 4 March 1865. President Lincoln died by assassination 15 April, and Johnson became President. His policy toward the seceded States was, contrary to expectation, one of leniency. On 22 May he opened all Southern ports save four in Texas, to foreign commerce, and 29 May he proclaimed general amnesty to all except 14 specified classes. These and similar measures aroused the opposition of the majority of Republicans in Congress, and thenceforward differences between the executive and legislative branches of the government were constantly arising. Johnson established provisional governments, afterward disallowed by Congress, in seceded States, and Congress retaliated by passing over his veto of 27 March 1866 the civil rights act, admitting freedmen to full citizenship rights. In August 1866 he undertook a tour of the Northern States which became known as "swinging 'round the circle," and in the course of which he denounced Congress and advocated his own plan of reconstruction. Other bills, including one for the arrangement of the Southern States, with the exception of Tennessee, into military districts; and the tenure-of-office act, were passed over the President's veto. In August 1867 Johnson removed from office Stanton, secretary of war, and appointed Grant to the post; but in September following Congress refused to ratify the removal, Grant resigned, and Stanton resumed his former duties. On 21 Feb. 1868 Johnson dismissed Stanton and appointed Gen. Lorenzo Thomas secretary ad interim. Two unsuccessful attempts to impeach the President had already been made. On 24 February a resolution of impeachment was passed by the House and on 5 March the trial began. Eleven articles charged the President with high crimes and misdemeanors in connection with five various matters, most important of which were the removal of Stanton in disregard of the tenure-of-office act and the appointment of Thomas. The trial was presided over by Chief Justice Chase. On 16 May a test vote resulted in 35 for conviction, 19 against; and the requisite two thirds vote not having been obtained, the President was acquitted. The result is now generally approved. "The single vote by which Andrew Johnson escaped conviction," says Dunning, "marks the narrow margin by which the Presidential element in our system escaped destruction." In January 1875 he was chosen to the Senate, and 5 March took his seat in the extra session. He was sincere and able, and if Congress viewed his procedure as usurpation no less did he believe that of Congress to be unconstitutional. Consult: Dunning, 'Essays on the Civil War and Reconstruction' (1898); and Dewitt, 'The Impeachment and Trial of Andrew Johnson' (1903), a spirited defense. See also UNITED STATES — RECONSTRUCTION.

Johnson, Bradley Tyler, American lawyer: b. Frederick, Md., 29 Sept. 1829; d. 5 Oct. 1903.



ANDREW JOHNSON,
17TH PRESIDENT OF THE UNITED STATES.

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He was graduated from Princeton in 1849, studied law at Harvard in 1850-1, entered practice at Frederick in 1851, became in that year State's attorney for Frederick County, was a delegate to the National Democratic Convention at Charleston and Baltimore in 1860, withdrew from the convention, and supported the Breckinridge and Lane ticket. At his own expense he organized a company for the Confederate service, in which he rose to be brigadier-general of cavalry (1864). Subsequent to the War he practised law at Richmond in 1865-79, at Baltimore in 1879-90; and was a member of the State senate of Virginia in 1875-90. His works include: 'Reports of Chase's Decisions' (1875) 'Memoir of J. E. Johnston' (1891); a 'Life of General Washington'; etc.

Johnson, Bushrod Rust, American soldier: b. Belmont County, Ohio, 7 Oct. 1817; d. Brighton, Ill., 11 Sept. 1880. He was graduated at West Point in 1840. He saw service in the Florida and Mexican wars, resigning his commission in 1847 to become professor in the Western Military Institution of Kentucky, at Georgetown. He entered the Confederate army as a brigadier-general at the commencement of the Civil War, and in 1864 became a major-general. He commanded a division under General Lee till the surrender at Appomattox. He subsequently became superintendent of the Military College in the University of Nashville, and chancellor of that institution.

Johnson, Cave, American politician: b. Robertson County, Tenn., 11 Jan. 1793; d. Clarksville, Tenn., 23 Nov. 1866. Admitted to the bar, he practised at Clarksville, in 1820 became a judge of the State circuit court, and was a Democratic representative in Congress in 1829-37 and again in 1839-45. In 1845 he was appointed postmaster-general, from which post he retired at the close of Polk's administration (1849). He was president of the Tennessee State bank in 1850-9, and was elected to the State senate as a Unionist in 1863, although unable to serve because of ill-health.

Johnson, Clifton, American author and illustrator: b. Hadley, Mass., 25 Jan. 1865. He obtained a secondary education, worked on a farm, was clerk in a book-shop and school-teacher, studied in the New York art-schools, published in 1892 'The New England Country,' an illustrated study of farm-folk, and later was much abroad obtaining notes and pictures for works on foreign life. Other volumes of which he is author and illustrator are: 'The Country School' (1893); 'The Farmer's Boy' (1894); 'What They Say in New England' (1896); 'Among English Hedge Rows' (1899); etc.

Johnson, David, American painter: b. New York May 1827. He was self-taught, excepting for the few lessons he received from Jasper F. Cropsey, and chose American landscape as his specialty. Among his works are: 'Echo Lake' (1869); 'Lake George' (1876); 'Greenwood Lake' (1878).

Johnson, E. Pauline, Canadian poetess: b. Chieftwood, Ont., 1862; the daughter of George Johnson, head chief of the Mohawk Indians, and of his English wife. She has written several striking poems on Indian subjects and has given

public recitals from her works. 'The White Wampum' appeared in 1894.

Johnson, Eastman, American painter: b. Lowell, Maine, 29 July 1824. He began his art studies at Dusseldorf (1849-51) and developed a distinct talent for genre, with a leaning toward domestic and sentimental incident. He afterward traveled in France, Italy, and Holland, and spent four years at The Hague. Among his pictures painted in Europe are the 'Savoyard,' and the 'Card Players,' in which he showed the influence of the Dutch school. He returned to the United States in 1856 and devoted himself for some years to the study of rustic and negro life and he has painted some of the most popular pictures ever produced by a native painter; many of them have been engraved and chromolithographed. The best known are 'Old Kentucky Home'; 'Husking Bee'; and the 'Boyhood of Abraham Lincoln.' He has also produced excellent likenesses of Grover Cleveland, Benjamin Harrison and other eminent men.

Johnson, Edward, American colonial historian: b. Herne Hill, Kent, England, about 1599; d. Woburn, Mass., 23 April 1672. He emigrated to America probably with Governor Winthrop in 1630. In 1632 he was engaged in trade at Merrimack, and was on the committee appointed to superintend the foundation of a new town and church at the place now called Woburn. In 1643 he was elected by the town of Woburn a member of the legislature of Massachusetts, in which he continued to sit till 1671, with the exception of 1648. In 1655 he was chosen speaker of the house. He was recorder of Woburn from the time of its incorporation till his death. In 1665 he was one of the members deputed to hold conference with the commissioners sent from England by Charles II. He wrote a 'History of New England from the English Planting in 1628 till 1652, or Wonder-Working Providence of Zion's Saviour' (1654).

Johnson, Edward, American soldier: b. Chesterfield County, Va., 16 April 1816; d. Richmond, Va., 22 Feb. 1873. Graduated from the United States Military Academy in 1838, he fought in the Florida wars, for his services in which he was brevetted captain, and subsequently in the Mexican War, being brevetted major for his conduct at Chapultepec. He received his captain's commission in 1851, but in 1861 resigned to enter the army of the Confederate States as colonel of the 12th Georgia volunteers. He was promoted brigadier-general in 1862 and major-general in 1863. At Gettysburg he commanded a division. He was captured with his entire force at Spottsylvania (12 May 1864) and retaken in the following December. Subsequent to the war he was a farmer in Chesterfield County, Va.

Johnson, Franklin, American Baptist clergyman and scholar: b. Frankfort, Ohio, 2 Nov. 1836. He was graduated from the Colgate Theological Seminary (Hamilton, N. Y.), in 1861, held pastorates in Michigan, New Jersey, and at Cambridge, Mass., in 1862-88, was co-editor of 'The Watchman' in 1876, and in 1890-2 president of Ottawa University. In 1892 he was appointed professor of history and homiletics in the University of Chicago. Among his writings, besides translations and an annotated edition of St. Matthew, are: 'Moses and Israel'; 'Heroes and Judges from the Lawgiver to the

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King'; 'The New Psychic Studies in their Relation to Christian Thought.'

Johnson, Helen Kendrick, American author: b. Hamilton, N. Y., 4 Jan. 1843. She was the daughter of A. C. Kendrick (q.v.) and was married to Rossiter Johnson (q.v.) in 1869. Beside editing several compilations of verse she has published 'The Roddy Books,' popular juvenile tales (1874-6); 'Our Familiar Songs' (1881); 'Raleigh Westgate' (1889); 'Woman and the Republic' (1897). She has been an active member of the Association Opposed to the Extension of Suffrage to Women.

Johnson, Herschel Vespasian, American jurist and politician: b. Burke County, Ga., 8 Sept. 1812; d. Jefferson County, Ga., 16 Aug. 1880. He was graduated from the University of Georgia in 1834, studied law, practised there, from 1844 at Milledgeville, and in 1848 was appointed to the Senate of the United States to fill the seat of W. T. Colquitt, resigned. A strong advocate of Clay's compromise scheme, he identified himself with the Southern Unionists. In 1849-53 he was a judge of the Georgia superior court, in 1853-7 governor of the State. He was nominated by the northern Democracy in 1860 as vice-president on the presidential ticket with Douglas. Though opposed to secession, he followed his State, and in 1862 was elected to the Confederate Congress. Elected United States senator in 1866, he was refused his seat because of war disabilities. He was a judge of the Georgia superior court from 1873 until his death.

Johnson, Horace Chauncey, American artist: b. Oxford, Conn., 1 Feb. 1820. He was a pupil of A. H. Emmons at Hartford, and of the antique school of the National Academy, New York; studied also in Rome (1856-8); established his studio in Italy, and later at Waterbury, Conn. His works include: 'Roman Peasants on the Campagna'; 'Grape Gatherers of Gensano'; 'Italian Kitchen'; 'Azrael'; etc.

Johnson, Sir John, American colonial soldier: b. near Johnstown, N. Y., 5 Nov. 1742; d. Montreal 4 Jan. 1830. He was the son of Sir William Johnson (q.v.), was knighted in 1765 and succeeded to his father's estates and baronetcy in the Mohawk Valley in 1774. When the Revolution came on he escaped to Canada in 1776 with 700 loyalists. He organized the corps known as the Queen's Own American Regiment, of which he was commissioned colonel. In July 1777, he took part in the siege of Fort Stanwix (q.v.). He defeated General Herkimer in the latter's brilliant attempt to cause the besiegers to abandon their operations; but was himself subsequently defeated. During the next two years he continued active in northern and central New York, and the Indian massacres of Cherry Valley and Wyoming formed some of the most painful incidents of the war. He was, however, crushingly defeated at Newton 29 Aug. 1779, and retired to Montreal. His influence over the Indians had always been remarkable and the British government appointed him superintendent-general of Indian affairs in British North America, besides making him extensive land grants, to replace the Mohawk family estates which had been confiscated.

Johnson, Lionel Pigot, English poet: b. Broadstairs, Kent, March 1867; d. 9 Oct. 1902.

He was educated at Winchester College, and Oxford University. He published 'Poems'; 'Ireland and Other Poems'; and 'The Act of Thomas Hardy'; and contributed to 'The Academy' and other literary journals. His verse though often obscure exhibited much command of metre and was full of promise.

Johnson, Oliver, American reformer and editor: b. Peacham, Vt., 27 Dec. 1809; d. Brooklyn, N. Y., 10 Dec. 1889. He became editor of 'The Christian Soldier' in 1831, and from that year to 1865 was engaged in the anti-slavery cause as a lecturer and editor. He was one of the founders of the New England Anti-Slavery Society in 1832. He was editor of the 'Independent' from 1865 to 1870; became editor of the 'Christian Union' in 1872; and published 'William Lloyd Garrison and his Times' (1880).

Johnson, Owen, American novelist: b. New York 27 Aug. 1878. He is a son of R. U. Johnson (q.v.) and was graduated from Yale in 1900. He has published 'Arrows of the Almighty' (1901).

Johnson, Reverdy, American jurist: b. Annapolis, Md., 21 May 1796; d. there 10 Feb. 1876. He was educated at St. John's College in that city, and at 17 began to study law. In 1815 he was admitted to the bar, in 1817 removed to Baltimore and subsequently devoted his time mainly to the arguing of cases before the United States Supreme Court. He reported seven volumes of the decisions of the Maryland court of appeals, known as 'Harris's and Johnson's Reports,' 1820. In 1821 he was elected a State senator, and at the expiration of his term in 1825 was re-elected for a second term. In 1845 he was chosen a United States senator, resigning in 1849 on being appointed attorney-general of the United States. On the succession of Mr. Fillmore, after the death of President Taylor, he resigned that office, and resumed in Baltimore the practice of the law. In 1861 he was a member of the peace commission, was United States senator 1863-8, and succeeding Charles Francis Adams as minister to England in 1868 negotiated the treaty for the adjustment of the Alabama claims, afterward rejected by the Senate.

Johnson, Richard Mentor, American statesman and soldier: b. Floyd's Station, near Louisville, Ky., 17 Oct. 1780; d. Frankfort, Ky., 19 Nov. 1850. He was educated at Transylvania University, and subsequently studied law and practised with success. He commenced his public career as a member of the Kentucky legislature, to which he was elected at 23, and in 1807 was returned to Congress, and remained a member of the House until 1819. He was a firm supporter of the administration of Madison, and upon the commencement of the War of 1812 raised a body of Kentucky mounted riflemen, whom he commanded, on the Canadian frontier. The decisive charge of his mounted volunteers mainly contributed to the brilliant victory gained over the British and Indians at the battle of the Thames, 5 Oct. 1813, and it was by his hand that the Indian leader Tecumseh is commonly supposed to have fallen. In 1819 he was elected to fill a vacancy in the United States senate, of which he continued a member until 1829, when he was again returned to the House of Representatives. He remained a member until his election by the Senate in March, 1837, as Vice-President of the United States.

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He discharged the duties of presiding officer of the senate for four years, and in the Presidential election of 1840 was an unsuccessful candidate of the Democratic party for Vice-President. He thenceforth lived chiefly in retirement. He was, however, serving a term in the State legislature at the time of his death. In Congress his chief efforts were against the discontinuance of the Sunday mails, and in behalf of soldiers of the Revolution or of the War of 1812, who applied for pensions. He was the author of the law abolishing imprisonment for debt in Kentucky.

Johnson, Richard W., American military officer: b. near Smithland, Ky., 7 Feb. 1827; d. St. Paul, Minn., 21 April 1897. He was graduated at West Point in 1849, in 1861 became colonel of the 3d Kentucky cavalry, 11 October was appointed brigadier-general of volunteers, and later commanded a division at Murfreesboro, and with his division fought under Thomas at Chickamauga (19-21 Sept. 1863). He commanded the 12th division of the Army of the Cumberland in the invasion of Georgia and a division of cavalry at Nashville, was brevetted brigadier-general, United States army, for his services (13 March 1865), and, having been mustered out of the volunteer service, became provost-marshal of the military division of the Tennessee. In 1867 he resigned from the service with rank of major-general, changed by act of Congress (1875) to brigadier. Among his writings were: 'Life of Gen. G. H. Thomas' (1881); and 'A Soldier's Reminiscences' (1886).

Johnson, Robert Underwood, American editor and poet: b. Washington, D. C., 12 Jan. 1853. He became associate editor of the 'Century Magazine' in 1881. His efforts as secretary of the American Copyright League in behalf of the establishment of international copyright greatly aided in obtaining the law of 1891. He edited, with C. C. Buel, the notable 'Battles and Leaders of the Civil War' (1887-8), and has published three volumes of verse: 'The Winter Hour and Other Poems' (1891); 'Songs of Liberty and Other Poems' (1897); and 'Poems' (1902).

Johnson, Rossiter, American author and editor: b. Rochester, N. Y., 27 Jan. 1840. He was graduated from the University of Rochester in 1863 and was associate editor of the Rochester *Democrat* 1864-8. From 1869 to 1872 he edited the *Concord* (N. H.) *Statesman*; and in 1873-7 was associated with George Ripley and Charles A. Dana in editing the *American Cyclopædia*, while in 1879-80 he aided Sydney Howard Gay in his 'History of the United States.' Since 1883 he has been editor of the 'Annual Cyclopædia.' He edited the series of 'Little Classics' (8 vols. 1874-80), and was editor-in-chief of the 'World's Great Books' (50 vols. 1898-1901). His original works include 'Phae-ton Rogers,' a novel of boy life (1881); 'A History of the French War ending in the Conquest of Canada' (1882); 'History of the War of 1812' (1882); 'Idler and Poet,' verse (1883); 'Short History of the War of Secession' (1888); 'The End of a Rainbow,' a story (1892); 'The Hero of Manila' (1899); 'Short History of the War with Spain' (1899).

Johnson, Samuel, American college president, first president of King's College (now

Columbia University): b. Guilford, Conn., 14 Oct. 1696; d. Stratford, Conn., 6 June 1772. He was graduated at Yale College in 1714, and two years later appointed tutor there. In 1720 he resigned to receive ordination as a Congregational minister, and settled at West Haven. He relinquished his charge in 1722, and soon after sailed for England, where he received Episcopal ordination in 1723. Shortly after he returned to America, bearing a commission as missionary of the Society for the Propagation of the Gospel in Foreign Parts, and settled in Stratford, Conn., as rector of an Episcopal church there. In 1743 he received the degree of D.D. from the University of Oxford. In 1746 he published 'A System of Morality,' and in 1752 a compend of logic and metaphysics, and another of ethics; the two latter were printed in Philadelphia by Franklin as text-books for the University of Pennsylvania. In 1755 he was offered the presidency of that university, but declined it. In 1753 he was invited to accept the presidency of the newly founded King's College in New York, in all the plans for which he had been consulted. He did so, but in 1763 resigned and returned to Stratford, where he resumed his parochial duties, revised his previous works, and published an 'English and a Hebrew Grammar' (1767). Consult Beardsley, 'Life of Samuel Johnson, D.D.' (1876).

Johnson, Samuel, English lexicographer, poet and essayist: b. Lichfield, Staffordshire, 19 Sept. 1709; d. London 13 Dec. 1784. He was the son of a Lichfield bookseller and was educated mainly in the grammar school of that city; although perhaps the best part of his education he gave himself, in the free run which he had of the books in his father's shop. Lichfield was the literary centre of a large district and old Michael Johnson supplied scholars with their folios, as well as less severe readers with romances, poems, essays, and pamphlets. Samuel read with wonderful rapidity, ravenously as if he devoured the book, and what he read his powerful memory retained. At 19 he entered Pembroke College, Oxford, "the best qualified for the university that his tutor had ever known come there." Thence he was driven by poverty after a residence of only 14 months. During the next few years he lived partly by teaching. At 26 he married. Two years later he went up to London with a half-finished tragedy in his pocket, and David Garrick as his companion. There for five-and-twenty years he lived the hard life of a poor scholar. His wife died after a long illness. In this period of his life he did most of his work. He wrote the 'Debates of Parliament,' which were wholly in form and mainly in substance his own invention; his great 'Dictionary'; his two poems 'London' (1738); and 'The Vanity of Human Wishes' (1749); the 'Rambler,' the 'Idler,' and 'Rasselas' (1759), and numerous minor pieces. He published moreover 'Observations on Macbeth,' and made a beginning of his edition of Shakespeare. In 1762 a pension of £300 from the king freed him from the pressure of poverty and the rest of his life he passed in modest comfort. A friendship which he formed a little later added greatly to his happiness. A wealthy London brewer of the name of Thrale, a man of such rugged strength that he sought a comrade in his rough genius, gave him a second home. His pen had

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long intervals of rest. He finished his Shakespeare, wrote four political tracts which added nothing to his reputation, and his 'Journey to the Western Islands' (1775). Happily he was roused from his indolence by the request of the booksellers that he should undertake that one of all his works by which he is best known,—the 'Lives of the English Poets' (1779-81). "I wrote it," he says, "in my usual way, dilatorily and hastily: unwilling to work, and working with vigor and haste." The indolence into which he seemed to have sunk was more apparent than real. That powerful mind was seldom long at rest. "He was a kind of public oracle, whom everybody thought they had a right to visit and consult." David Hume might complain that "men of letters have in London no rendezvous, and are indeed sunk and forgotten in the general torrent of the world." They who knew Johnson felt no such want. "His house became an academy." So did the taverns which he frequented, whose chairs he looked upon as so many thrones of human felicity. Among his friends he numbered Reynolds, Burke, Goldsmith, Garrick, and Boswell. They were all members of that famous club of which he was the light and centre. In the world of letters his opinion was eagerly awaited. "What does Johnson say of such a book?" was the question of every day. This, the happiest period of his life, was brought to an end by the death of Mr. Thrale in 1781. Though the ranks of his friends were thinning and his strength was failing he did not lose heart. He tried "to keep his friendships in constant repair," and he struggled hard for life. "I will be conquered," he said; "I will not capitulate." Death had always been terrible to him. He now faced it month after month in the gloom of solitude. "His death," wrote one of his contemporaries, "kept the public mind in agitation beyond all former example." "It made a kind of era in literature," said Hannah More. Harriet Martineau was told, by an old lady who well remembered the time, that "the world of literature was perplexed and distressed as a swarm of bees that have lost their queen." High as Johnson still stands as a writer, his great reputation rests mainly on his talk and on his character as a man, full as it was of strange variety, rugged strength, great tenderness, dogged honesty and truthfulness, a willingness to believe what was incredible combined with "an obstinate rationality" which ever prevented him, and Toryism with the spirit of a rebel glowing beneath. It is in the pages of his friend and disciple that he lives for us as no other man has ever lived. Of all men he is best known. In his early manhood he set up an academy, and failed. The school which he founded in his later years still numbers its pupils by thousands and tens of thousands. "We are," said Sir Joshua Reynolds, "of Dr. Johnson's school. He may be said to have formed my mind, and to have brushed from it a great deal of rubbish. He qualified it to think justly." He still qualifies the mind to think; he still clears it of cant; he still brushes from it all that rubbish which is heaped up by affectation, false sentiment, exaggeration, credulity and indolence in thinking. Even in his lifetime his written style was censured as "involved and turgid, and abounding with antiquated and hard words." Macaulay went so far as to pronounce it "systematically vicious." In the structure of his sentences he is as often at fault as in

the use of big words. He praised Temple for giving a cadence to English prose, and he blamed Warburton for having "his sentences unmeasured." His own prose is too measured and has too much cadence. It is in his 'Rambler' that he is seen at his worst, and in his 'Lives of the Poets' at his best. He often rose to noble heights of eloquence; while in the power of his honest scorn he had scarcely a rival. His letters to Lord Chesterfield and James Macpherson are not surpassed by any in our language. In his criticisms he is admirably clear. Whether we agree with him or not, we know at once what he means; while his meaning is so strongly supported by argument that we can neither neglect it nor despise it. He may put his reader into a rage, but he sets him thinking. Of his original works, 'Irene' (1749) was the first written, though not the first published. It is a declamatory tragedy. He had little dramatic power, and he followed a bad model, for he took Addison as his master. It was in his two imitations of Juvenal's Satires, 'London' and the 'Vanity of Human Wishes,' that he first showed his great powers. In their kind they are masterpieces. Sir Walter Scott "had more pleasure in reading them than any other poetical composition he could mention. In the 'Rambler' he teaches the same great lesson of life as in his serious poems. He gave variety, however, by lighter papers modeled on the 'Spectator,' and by critical pieces. 'Rasselas,' struck off at a heat when his mother lay dying, tells in prose what the 'Vanity of Human Wishes' tells in verse. It is little known to the modern reader, who is not easily reconciled to its style. At no time could it have been a favorite with the young and thoughtless. Nevertheless, as years steal over us, we own, as we lay it down with a sigh, that it gives a view of life as profound and true as it is sad. His 'Dictionary,' faulty as it is in its etymologies, is a very great performance. Its definitions are admirable; while the quotations are so happily selected that they would afford the most pleasant reading were it possible to read a heavy folio with pleasure. That it should be the work of one man is a marvel. He had hoped to finish it in three years; it took him more than seven. In the notes to his edition of Shakespeare he anticipated modern critics in giving great weight to early readings. He was unwilling to meddle with the text so long as it gave a meaning. Many of his corrections are ingenious, but in this respect he came far behind Theobald. In his 'Journey to the Western Islands' he describes the tour which he made with Boswell in 1773, and takes the part of the oppressed tenants against their chiefs. His narrative is interesting; while the facts which he gathered about a rapidly changing society are curious. His last work was the 'Lives of the English Poets.' It was undertaken at the request of the chief London booksellers, "who had determined to publish a body of English poetry," for which he was to furnish brief prefaces. These prefaces swelled into Lives. For payment he had required only two hundred guineas. "Had he asked one thousand, or even fifteen hundred," said Malone, "the booksellers would doubtless readily have given it." In this great work he traveled over the whole field of English poetry, from Milton who was born in 1608 to Lyttleton who died in 1773. To such a task no man ever came better equipped. In these 'Lives,' and in

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his own 'Life' as told by Boswell, we have given us an admirable view of literature and literary men, from the end of the age of Elizabeth to close upon the dawn of the 19th century. Consult: Boswell, 'Life of Johnson' ed. by Hill (1887); Hill, 'Dr. Johnson, his Friends and his Critics' (1878); 'Lives' by Stephen (1878); Grant (1887).

Johnson, Samuel, American preacher and author: b. Salem, Mass., 10 Oct. 1822; d. North Andover 19 Feb. 1882. He was graduated from Harvard in 1842, and from the Harvard Divinity School in 1846. He joined no religious denomination, and save for one year with a Unitarian church in Dorchester, was not settled as a minister until 1853, when he established in Lynn, Mass., an independent society, with which he remained till 1870, then withdrew to complete studies of many years, the results of which appeared later in his publications. With Samuel Longfellow (q.v.) he compiled a 'Book of Hymns' (1846) and 'Hymns of the Spirit' (1864). Some of his own inspiring hymns in these books are now found in the collections of various denominations. His critical study 'The Worship of Jesus' (1868), written in accordance with his views of universal religion, is described by O. B. Frothingham as "perhaps the most penetrating and uplifting essay on that subject in any language." He printed notable essays on religion, reform, etc., in 'The Radical' and other periodicals. His great work 'Oriental Religions,' including 'India' (1872), 'China' (1877), and 'Persia' (1885)—the last containing an introduction and a critical estimate of Johnson by O. B. Frothingham—represents what Johnson himself calls his "purely humanistic point of view." His philosophy was highly transcendental; but being versed in many languages, he was acquainted with all schools, and with the results of history, literature, science, and criticism in every department. 'Oriental Religions,' in the task of writing which scholars have compared his competence, patience, and thoroughness with the same qualities in Darwin, has taken its place among the most learned and liberal contributions to the study of comparative religion and civilization. Prof. E. J. Eitel, the German Orientalist, wrote of "Johnson's pre-eminent merits as the historian of universal religion," and F. Max Müller paid him tribute as the finder of "a religion behind all religions." His 'Theodore Parker' (1890) is a profoundly spiritual interpretation of that preacher and reformer, whose work on the intellectual side was surpassed by Johnson's, while on the moral side, as in the anti-slavery conflict, they stood as equal comrades. A little volume of Johnson's hymns, with other poems, was published in 1899. Consult Longfellow, 'Lectures, Essays, and Sermons by Samuel Johnson, with a Memoir.' This volume contains some of Johnson's best papers, including brilliant lectures on 'Switzerland' and 'Florence,' the outgrowth of searching observations in Europe, 'Equal Opportunity for Woman,' 'Labor Parties and Labor Reform,' and an illuminative essay on 'Transcendentalism.'

Johnson, Samuel Frost, American painter: b. New York 1835. He received his art education in New York, Düsseldorf, Antwerp, and Paris, in which last place he was a pupil at the Ecole des Beaux Arts. He afterward went to

Ecouen and worked under the direction of Edouard Frère, the celebrated painter of children. He produces genre, still life and portraits. Among his genre subjects may be mentioned 'Caught at It'; 'Study of an Interior'; 'Roasted Chestnuts'; 'Good Night'; and 'A Thirsty Party.'

Johnson, Samuel William, American chemist: b. Kingsboro, N. Y., 3 July 1830. He studied at Yale Scientific School and the Universities of Leipsic and Munich. In 1856 he became professor of analytical and agricultural chemistry in the Sheffield Scientific School of Yale and since 1866 professor emeritus. He has published 'Essays on Peat Muck and Commercial Manures' (1859); 'How Crops Feed' (1870); etc.

Johnson, Thomas, American statesman: b. St. Leonard's, Md., 1732; d. 1819. He studied law at Annapolis, was elected to the first Continental Congress (1774), was again sent to Congress in 1776, and in the latter year became brigadier-general of Maryland militia. In 1777 he was chosen governor of Maryland, remaining in office until the close of 1779. In 1780 he entered the provincial congress and the house of delegates, in 1781-7 was in the Continental Congress, in 1791 became an associate justice of the United States Supreme Court, and later declined the office of chief justice.

Johnson, Tom Loftin, American capitalist and politician: b. Georgetown, Ky., 18 July 1854. He was clerk in a street railway office (1869-75), and invented several street railway devices; became owner of a street railway in Indianapolis and later acquired large interests in Cleveland and other cities; he was also interested in the iron manufacture in Cleveland. He has been prominent in politics as a member of the Democratic party, and is known as an advocate of the single tax (q.v.), and public ownership of public utilities. Though opposed to the free coinage of silver, he supported Bryan in 1896 and 1900, and the State convention which he controlled unanimously endorsed the Kansas City platform. He was a member of Congress from 1891-5. In 1901 he was elected mayor of Cleveland, and was reelected in the spring of 1903. In this position he has been an advocate of three cent street railway fares. In the fall of 1903 he was Democratic candidate for governor of Ohio, but was defeated by a large plurality.

Johnson, Virginia Wales, American novelist: b. Brooklyn, N. Y., 28 Dec. 1849. Since 1875 she has lived in Florence, Italy. Her publications include: 'Kettle Club Series' (1870); 'Travels of an American Owl' (1870); 'Joseph the Jew' (1873); 'A Sack of Gold' (1874); 'The Catskill Fairies' (1875); 'The Calderwood Secret' (1875); 'A Foreign Marriage' (1880); 'The Neptune Vase,' her finest work (1881); 'The Fainails of Tipton' (1885); 'Tulip Place' (1886); 'Miss Nancy's Pilgrimage' (1887); 'The House of the Musician' (1887); and other fictions, and several descriptive works, such as 'Genoa, the Superb'; 'The Lily of the Arno'; 'Lake Como.'

Johnson, Walter Rogers, American chemist: b. Leominster, Mass., 21 June 1794; d. Washington, D. C., 26 April 1852. He was graduated from Harvard in 1818, taught for many years in Framingham, and Salem, Mass., and in

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Philadelphia, and was professor of physics in the University of Pennsylvania, 1839–43. He was the first secretary of the Association for the Advancement of Science, and published ‘Use of Anthracite’ (1841); ‘Report on Coals’ (1844); ‘Coal Trade of British America’ (1850); etc.

Johnson, Sir William, British superintendent-general of Indian affairs in North America: b. Smithtown, County Meath, Ireland, 1715; d. near Johnstown, N. Y., 11 July 1774. His uncle, Sir Peter Warner, offered his nephew the management of his entire property in New York, if the latter would undertake its improvement and settlement. Johnson accepted the offer, and in 1738 established himself upon a tract of land on the south side of the Mohawk, about 25 miles from Schenectady, which Sir Peter had called Warrensburgh. In addition to the settling and improving of the country, he embarked in trade with the Indians, whom he always treated with perfect honesty and justice. He became a master of their language, speaking many of their dialects as perfectly as they did themselves, and was thoroughly acquainted with their beliefs and customs. He was adopted by the Mohawks as one of their own tribe, chosen a sachem, and named Wariaghejaghe, or Warraghiahy, “he who has charge of affairs.” In 1744 he was appointed colonel of the Six Nations, in 1746 commissioner of New York for Indian affairs. In 1750 he became a member of the provincial council. In 1754 he attended as one of the delegates from New York the congress of Albany, and also the great council held with the Indians on that occasion, at which they strongly urged his reappointment as their superintendent. At the council of Alexandria, 14 April 1755, he was sent for by Braddock and commissioned by him “sole superintendent of the affairs of the Six United Nations, their allies and dependents.” He was also, pursuant to the determination of that council, created a major-general, and commander-in-chief of the provincial forces destined for the expedition against Crown Point. At the head of these forces, in September 1755, he defeated Baron Dieskau at Lake George. This victory saved the colony from the French, and Johnson received the thanks of parliament for his victory, was voted £5,000, and on 27 Nov. 1755, created a baronet of Great Britain. On his arrival at Lac St. Sacrement a few days before this battle, he gave to it the name of Lake George, “not only in honor of his majesty, but to assert his undoubted dominion here.” In March 1756 he received from George II. a commission as “colonel, agent, and sole superintendent of the affairs of the Six Nations, and other northern Indians.” He held this office for the rest of his life. In 1758 was present with Abercrombie at Ticonderoga. General Prideaux led the expedition against Fort Niagara in 1759. Johnson was second in command, and upon the death of Prideaux, before that fort, succeeded to the command in chief. With upward of 1,000 Indian allies he continued the siege with great vigor and cut to pieces the French army. He led the same Indian allies the following year in the Canadian expedition of Amherst, and was present at the capitulation of Montreal and the surrender of Canada to the British arms in 1760. The war was now at an end, and the king granted to Sir William for his services a tract of about 100,000 acres of land, north of the Mohawk. In 1764,

the country being at peace, and the Indians perfectly contented, Sir William erected Johnson hall, a large wooden edifice still standing. The village of Johnstown, with stores, an inn, a court-house, and an Episcopal church, was soon laid out. In 1772 it became the shire town of Tryon County. Johnson lived in the style of an old English baron of former days, and exercised a liberal hospitality. In 1768 he concluded the treaty of Fort Stanwix. Consult the ‘Life’ by Stone (1865).

Johnson, William Henry, American historical novelist: b. Beaufort, S. C., 29 March 1845. He studied for the Episcopal ministry in the Theological Seminary of Virginia, served in the Confederate army during the Civil War, and in 1872 took orders in the Episcopal Church. In 1886 he withdrew from the Episcopal Church to enter the Unitarian, and was pastor for several years of a Unitarian church at Wilmington, Del. He has published ‘The King's Henchman’ (1898); ‘King or Knave: Which Wins?’ (1899); ‘The World's Discoverers’ (1900).

Johnson, William Samuel, American jurist: b. Stratford, Conn., 7 Oct. 1727; d. there 14 Nov. 1819. He was graduated from Yale in 1744, was admitted to the bar, practised in the New York and Connecticut courts, in 1761 and 1765 represented Stratford in the Connecticut general assembly, or lower house, and in the latter year was a Connecticut delegate to the Stamp-act congress at New York. In 1766 he became a member of the governor's council, or upper house of the Connecticut legislature, in 1766–71 was in England as special agent for the colony in defense of its title to land obtained from the Mohegan Indians, in 1771 re-entered the council, and for a time in 1772 was a judge of the superior court of the colony. After Lexington, he was a member of a committee sent to General Gage on the unsuccessful mission of inquiring into possible means of peace. Opposed to the Revolution, he remained in private life during its progress, but in 1784–7 was a member of the Continental Congress, in 1787–9 sat in the Connecticut assembly, in 1787–1800 was president of Columbia College, and from 1789 to 1791, when he resigned, was the first United States senator from Connecticut. His letters to the governors of Connecticut during his residence in Great Britain have been published in the ‘Collections’ of the Massachusetts Historical Society, 5th series, Vol. IX. (1885).

Johnson City, Tenn., city in Washington County, on the Southern railroad, 106 miles north of Knoxville. Its elevated location and picturesque mountain scenery make it a favorite summer resort for Southern people. Here is located the mountain branch of the National Soldiers' Home. The manufacturing interests include iron furnaces, rolling mills, machine shops, tanneries and brickmaking plants. The city was settled in 1870 and is governed under a charter of 1897, by a mayor and council elected biennially. Pop. (1890) 4,161; (1900) 4,645.

Johnson Grass. See GRASSES IN THE UNITED STATES.

Johnson's Island, Ohio, an island located at the mouth of Sandusky Bay, overlooking Lake Erie, about a mile long and a mile and a half wide. The island was used during the Civil War as a prison for captured Confederates. It

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was an ideal spot for a prison post. No prisoner was ever known to escape from it. The grounds were enclosed within a fence 12 feet high, with a platform top, upon which sentinels paced to and fro day and night. To the north Lake Erie stretches away for 50 miles; on the east, separated by three miles of water, lies Sandusky, while west and south of the island are broad stretches of Sandusky Bay. The island was used almost exclusively as a prison for officers, the total number confined there from first to last aggregating over 15,000. The first prisoners were taken there in April 1862, and in September 1865 the last of them were sent to Fort Lafayette, and Johnson's Island was abandoned as a prison post. The men confined on Johnson's Island represented the flower of the chivalry of the South. They were largely professional men and planters, among them being many who were prominent in science, literature and art.

Johnston, jön-stōn, Albert Sidney, American general: b. Mason County, Ky., 3 Feb. 1803; d. Shiloh, Miss., 6 April 1862. General Johnston had but a brief career in the Confederate army, and the first part of that career was one of great disaster and consequently of severe criticism; but he fell "on the field of glory" at Shiloh, and not a few endorse the opinion of President Davis that he was the greatest general whom the war produced. Descended from a long line of illustrious ancestors, he obtained his literary education at Transylvania University, and was graduated at West Point 30 June 1826, being number eight in a brilliant class of which Jefferson Davis was a member. He was brevetted second lieutenant in the 2d infantry, transferred to the 6th infantry in 1827, was regimental adjutant from 1828 to 1832, aid to General Atkinson a year, and acting assistant adjutant-general to Illinois volunteers during the Black Hawk War—in all of which positions he showed the qualities of an accomplished soldier. He resigned his commission in the United States army 31 May 1834, having determined to settle in Texas and cast in his fortunes with the "Lone Star" Republic.

The battle of San Jacinto was fought 21 April 1836, and soon after Johnston arrived in Texas and enlisted as a private soldier in the Texan army. His merit soon brought him promotion, and he was made adjutant-general of the Army of Texas, and not long after brigadier-general and chief commander of the army in the place of General Felix Houston. As a result of jealousy growing out of this promotion there was an unfortunate duel between Houston and Johnston, in which the latter was wounded. He continued in command of the Texan army until 1838, when he was made secretary of war of the Republic of Texas. In 1839 he led an expedition against the hostile Cherokee Indians, and in a battle on the Neches, defeated and routed them with great slaughter. He used all of his abilities and wide influence in bringing about the annexation of Texas to the United States, and promptly enlisted when the Mexican War broke out, being colonel of a regiment of Texas volunteers. He was distinguished in various battles, especially at Monterey, where he had three horses shot from under him, and was highly complimented by General Butler on whose staff he was serving.

On 31 Oct. 1849 he was appointed by President Taylor paymaster in the United States army, with the rank of major, and when the 2d cavalry regiment was formed he was appointed, 3 March 1855, its colonel on the recommendation of his old classmate and lifelong friend, Jefferson Davis, who was at that time the able and efficient secretary of war. In 1857 he was put in command of an expedition to Utah to force the Mormons to submit to the laws of the United States Government, and overcame great difficulties and showed such ability and tact in the delicate mission that he was made brevet brigadier-general. When the War between the States broke out General Johnston was in command of the department of the Pacific, but he very promptly resigned his commission, and with a small party made his way across the plains, passing through New Orleans and reached Richmond on 2 September, where he had a cordial reception and was made a full general, and assigned to the command of the department of Kentucky, whither he went at once, beginning the able and efficient discharge of his duties there.

It could not be published at the time that he had a force barely 20,000 to defend that long line against overwhelming numbers of the enemy, and he was severely criticised in the newspapers for not being more aggressive, and when Forts Henry and Donelson fell, and he was compelled to fall back and abandon to the enemy so large a section of Confederate territory that abuse and severest criticism were heaped upon him, he was denounced as incompetent and his removal from command was demanded. President Davis calmly said: "If Albert Sidney Johnston is not a general, then I have none to put in his place." He wrote his old friend a noble letter, and Johnston replied in the same spirit, concluding with this sentiment: "The test of merit in my profession, with the people, is success. *It is a hard rule, but I think it right.* If I join this corps to the forces of General Beauregard (I confess a hazardous experiment), then those who are now exclaiming against me will be without an argument." He alluded to his plan of uniting with Beauregard to strike Grant before Buell and Mitchel could join him, and in pursuance of which plan he marched from Corinth, Miss., on 3 April, intending to attack Grant at Pittsburg Landing, or Shiloh Church, twenty miles off, on 4 April. There was delay on the part of some of the troops so that the attack could not be made until the morning of the 6th, but with his 40,000 men Johnston attacked Grant's 50,000 with such impetuosity, skill, and dash, that the Federals were driven back at every point, were huddled together at Pittsburg Landing, and there seemed to be lacking at 2:30 p. m. only one more vigorous advance to annihilate Grant's army. But just at this moment the great commander who had just remarked to one of his staff: "The victory is ours. We shall soon water our horses in the Tennessee River," was struck by a minie ball in his leg, and bled to death in 15 minutes. In the confusion which followed, the advance was not made. Beauregard (who had been ill in his ambulance all day and did not appreciate the real situation) ordered the Confederate lines to fall back. Buell and Mitchel came up that night with 55,000 fresh troops, and thus the fruits of Johnston's great

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victory were lost, and the next day the Confederates were compelled to fall back to Corinth.

No nobler eulogy could be pronounced on Albert Sidney Johnston than that of President Davis in a special message to the Confederate Congress, in which he said: "Without doing injustice to the living, it may safely be said that our loss is irreparable. Among the shining hosts of the great and good who now cluster around the banner of our country, there exists no purer spirit, no more heroic soul than that of the illustrious man whose death I join you in lamenting. In his death he has illustrated the character for which, through life, he was conspicuous—that of singleness of purpose and devotion to duty with his whole energies. Bent on obtaining the victory which he deemed essential to his country's cause, he rode on to the accomplishment of his object, forgetful of self, while his very life blood was fast ebbing away. His last breath cheered his comrades on to victory. The last sound he heard was their shout of victory. His last thought was his country, and long and deeply did his country mourn its loss."

It is scarcely extravagant to say that had Albert Sidney Johnston lived the victory at Shiloh would have been complete, the whole character of the campaign in the West would have been changed, and with Lee in Virginia and Johnston in the West, the result of the War might have been different. The monument to Albert Sidney Johnston in New Orleans is one of the most beautiful in the country; he is buried in Austin, the capital of his adopted State, and Texas proposes to honor herself by erecting to his memory a fitting monument.

J. W. M. JONES,
Author and Lecturer.

Johnston, Alexander, American historian: b. Brooklyn, L. I., 29 April 1849; d. Princeton, N. J., 21 July 1889. He was graduated from Rutgers College, N. J., in 1870, studied law and was admitted to the bar in 1876. He did not practise, however, and was professor of jurisprudence and political economy at Princeton University from 1883 till his death. He was the author of 'History of American Politics' (1879); 'Connecticut: a Study of a Commonwealth-Democracy' (1887); 'History of the United States for Schools' (1886); and 'The United States: its History and Constitution,' reprinted from the 'Encyclopædia Britannica' (1887).

Johnston, Alexander Keith, Scottish cartographer: b. Kirkhill, Edinburgh, Scotland, 28 Dec. 1804; d. 10 July 1871. His first important work, the 'National Atlas,' was published in 1843. At the suggestion of Humboldt, he visited Germany and gathered material for his 'Physical Atlas of Natural Phenomena' (1847-9), and his 'Royal Atlas of Geography' (1861) was one of the most beautiful and minutely accurate atlases ever published up to that time. His son of the same name (b. 1846; d. 28 June 1879) continued his father's enterprises.

Johnston, Gabriel, American colonial governor of North Carolina: b. Scotland 1609; d. 1752. Very little is known of his personal history. He was educated at the University of St. Andrew's, with a view to the medical profession, which he seems not to have practised. He

was for a while professor of Oriental languages at St. Andrew's, and then removed to London, where he was engaged with Pulteney and Bolingbroke in writing for the 'Craftsman.' By the influence of the Earl of Wilmington he was appointed governor of North Carolina, and took the oath of office at Brunswick 2 Nov. 1734. He was the ablest and most successful of all the colonial governors, holding the reins of power up to the time of his death.

Johnston, Harriet Lane, American gentlewoman: b. Mercersburg, Pa., 1833; d. Narragansett Pier, R. I., 3 July 1903. She was the niece of James Buchanan, afterward President of the United States, and on the death of her mother, Buchanan's sister, in 1839, was brought up under the care of her uncle. When the latter was minister to Great Britain, the niece presided over the hospitalities of the legation in London, and during his occupancy of the White House was its mistress, receiving among other distinguished guests the Prince of Wales, now Edward VII. On the occasion of his coronation in 1902 she was among the specially invited guests in recognition of the courtesies extended to him at the White House so long before. In 1866 she was married to Henry Elliott Johnston of Baltimore.

Johnston, Sir Harry Hamilton, English traveler: b. London 12 June 1858. He was educated at King's College, London, and the Royal Academy of Arts, traveled in North Africa, 1879-80, and Portuguese West Africa, and the Kongo region, 1882-3. He commanded a scientific expedition to Mount Kilimanjaro in 1884 and has held various consular posts in Africa. He has published 'Essays on the Tunisian Question' (1880-1); 'The River Congo' (1884); 'Kilimanjaro' (1885); 'History of a Slave' (1889); 'Life of a Livingstone' (1891); 'British Central Africa' (1897); 'History of the Colonization of Africa by Alien Races' (1899); 'The Uganda Protectorate' (1902).

Johnston, Henry Phelps, American historical writer: b. 1842. He is professor of history in the College of the City of New York, and has published 'The Battle of Harlem Heights'; 'Loyalist History of the Revolution'; 'The Yorktown Campaign'; etc.

Johnston, James Steptoe, American Episcopal bishop: b. Church Hill, Miss., 9 June 1843. He was educated at the University of Virginia, served as 2d lieutenant in the Confederate cavalry during the Civil War, subsequently studied law and was admitted to the bar. After practising for a short time he took orders in the Episcopal Church in 1869 and after holding rectorships at Port Gibson, Miss., six years; Mount Sterling, Ky., four years; and Mobile, Ala., eight years, became bishop of western Texas in January 1888.

Johnston, John, American Indian agent: b. Ballyshannon, Ireland, March 1775; d. Washington, D. C., 19 April 1861. He came to Cumberland County, Pa., in 1786, obtained a post in the War Department, in 1792 went to the Ohio Valley, later became a United States factor at Fort Wayne, Ind., and at the beginning of the War of 1812 was appointed Indian agent for Ohio, with headquarters at Piqua. President Harrison appointed him agent to the Senecas, with headquarters at Upper Sandusky, and in that capacity negotiated with the Senecas the

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treaty whereby they agreed to move westward across the Mississippi. He was president of the Historical and Philosophical Society of Ohio, and wrote: 'Present State of the Indian Tribes Inhabiting Ohio,' printed in 'Archæologia Americana' (transactions and collections of the American Antiquarian Society), Vol. I. (6 vols., 1820-74).

Johnston, Joseph Eggleston, American soldier: b. Cherry Grove, Va., 3 Feb. 1807; d. Washington, D. C., 21 March 1891. He was graduated at West Point in 1829; and served with distinction in the Black Hawk and Seminole wars. In the Mexican War he distinguished himself also and was brevetted major and colonel United States army for bravery at Cerro Gordo. He was promoted quartermaster-general of the army with the rank of brigadier-general in June 1860, but resigned his commission when Virginia seceded. He was then made major-general of Virginia volunteers and later full general in the Confederate service, taking an active part in the first battle of Bull Run, 21 July 1861, where he personally led a charge with the colors of the 4th Alabama regiment in his hands. At the battle of Fair Oaks, 31 May 1862, Johnston was severely wounded and was disabled for service for several months. In November he again reported for duty and was assigned to the Military Department of Tennessee. In the operations of Grant before Vicksburg he did everything possible to prevent the shutting up of General Pemberton in Vicksburg, telegraphing him May 2: "If Grant crosses, unite all your troops to beat him. Success will give back what was abandoned to win it." Although similar orders were repeatedly sent to Pemberton, they were disregarded; Pemberton allowed himself to be shut up in Vicksburg, and the siege and surrender on 4 July followed. In December of the same year he took command of Bragg's army at Dalton, Ga., and by the spring of 1864 brought it to a state of efficiency which it had not previously had, though it contained only 45,000 men against Sherman's 98,797. The campaign from Dalton to Atlanta, a distance of 100 miles, was a series of severe engagements without a general battle, Johnston's friends claiming "the retreat had been the masterpiece of Johnston's life, and one of the most skilful and successful that had ever been executed." On 17 July 1864 Johnston was superseded in this command by General Hood. In the early part of 1865 he was several times defeated by Sherman, to whom he surrendered at Durham Station, N. C., on 26 April, the terms of capitulation resembling those granted to Lee at Appomattox. After the war Johnston engaged in business, and was member of Congress 1876-8. He was United States Commissioner of Railways 1885-9, and the author of 'A Narrative of Military Operations During the Late War' (1874). Consult: Hughes, 'General Johnston' (1893).

Johnston, Mary, American novelist: b. Buchanan, Botetourt County, Va., 21 Nov. 1870. In 1898 she became suddenly famous through her 'Prisoners of Hope: a Tale of Colonial Virginia,' and her next book 'To Have and to Hold' (1900) was even more popular. She has since published 'Audrey' (1902).

Johnston, Richard Malcolm, American author: b. Powelton, Ga., 8 March 1822; d. Baltimore, Md., 23 Sept. 1898. He was graduated at Mercer University in 1841; was admitted to the bar in 1843; and began practice in Sparta, Ga., the same year. He was professor of literature in the University of Georgia in 1857-61 and served as colonel in the Confederate service during the Civil War. At its close he established a boys' boarding school at Sparta, which he removed in 1867 to Baltimore, and of which he was the head for many years. His publications include: 'Historical Sketch of English Literature'; 'Life of Alexander H. Stephens' (1883); 'Dukesborough Tales' (1883); 'Old Mark Langston'; 'Ogeechee Cross-Firings' (1889); 'Mr. Absalom Billingslea and Other Georgia Folk' (1887); 'Studies Literary and Social' (1891-2); 'The Primes and Their Neighbors'; 'Mr. Billy Downs and his Likes.' The usual theme of his longer as well as his shorter fictions is the life of the middle class Georgian in the ante-bellum period.

Johnston, Samuel, American lawyer and statesman, nephew of Gabriel Johnston (q.v.): b. Dundee, Scotland, 15 Dec. 1733; d. near Edenton, N. C., 18 Aug. 1816. His father, John, came to North Carolina in 1736, became surveyor-general, and acquired large landed estates. The son chose the profession of the law, and was clerk of the superior court in Chowan County for five years from 1767, and served there also as naval officer under the crown. Elected to the assembly in 1769 from the first he espoused the popular side, and in 1773 the assembly placed him on its standing committee of inquiry and correspondence, the organ by which it sought to co-operate with the other provinces. This was the first decisive step toward revolution taken by the legislature of North Carolina. He was an active member of the first two provincial congresses in this province. The 3d and 4th met at his summons, and he presided over the deliberations of both. In the 3d, August 1775, the political organization of the province was decided on, and the supreme executive authority was entrusted to a provincial council, of which he was made the chairman, and so virtually the governor of the province. In September 1775 he was chosen treasurer for the northern district of North Carolina. In 1781-2 he was a member of the Continental Congress. In 1787 he was elected governor of the State, and in 1788 presided over the convention which rejected the Federal Constitution, which, however, he supported with all his influence. He was United States senator 1789-93, and judge of the superior court 1800-03.

Johnston, William Preston, American educator: b. Louisville, Ky., 5 Jan. 1831; d. Lexington, Va., 16 July 1899. He was a son of A. S. Johnston (q.v.) and was graduated at Yale in 1852 and from the Louisville Law School in 1853. He served as colonel and aide-de-camp to Jefferson Davis in the Confederate army during the Civil War, and soon after its close became professor of history and literature at the Washington and Lee University, remaining there till 1877. In 1880 he became president of the Louisiana State University, and after its union with Tulane University, New Orleans, in 1884, was president of that institution till his death. His

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publications include: 'Life of General Albert Sidney Johnston'; 'The Johnstons of Salisbury'; 'The Prototype of Hamlet'; and 'Seekers after God' (poem).

Johnstown, jōnz'town, N. Y., city and county-seat of Fulton County, on Cayadutta Creek, and on the Fonda, J. & G. railroad, 44 miles northwest of Albany. In 1771, a few years after its settlement, it was named after its founder, Sir William Johnson, whose mansion, built here 10 years earlier, still stands almost as it was left by him. In 1808 Johnstown was incorporated as a village, and in 1805 it received a city charter. The court-house and jail, built by Sir William Johnson in 1772, occupy with Johnson Hall an interesting place in local history. The city has a public library building which was the gift of Andrew Carnegie. The industries of Johnstown include a variety of important manufactures, chief among which are those of gloves and mittens, knit goods of different kinds, leather, gelatin, lumber, grist-mill and machine-shop products, etc. The municipal government is well supported by public spirit, and the city's affairs are efficiently managed. The people elect the water board and the school board, and the waterworks are owned and operated by the city. Pop. (1890) 7,768; (1900) 10,130.

Johnstown, Pa., city, county-seat of Cambria County; on the Conemaugh River, and on the Baltimore & O. and the Pennsylvania R.R.'s; about 80 miles east of Pittsburgh. The Little Conemaugh River and Stony Creek unite at Johnstown and form the Conemaugh River. The area of the city is about five square miles, and the valley in which it is located is about 1,200 feet above sea-level. Johnstown was settled about 1790, but was not incorporated until 1889. Its situation, in a coal and iron ore region, combined with its great water power, has made it an important manufacturing centre. Fire-clay and limestone are also found in the vicinity. Some of its industrial establishments are the Cambria Steel Company works, where about 10,000 men are employed, the Lorain Steel Company, iron and steel works, iron-plate mills, street-car rail factory, planing-mills, cement works, furniture factories, potteries, breweries, brick-yards, machine-shops, foundries, furnaces, wire works, leather, and woolen goods. Some of the noted public buildings are the Cambria Free Library, the Conemaugh Valley Memorial Hospital, several churches, the Franciscan Monastery, the city hall, and the high school. The number and arrangement of the parks add to the beauty of the place. In Grand View Cemetery are the graves of 800 unidentified dead who perished in the "Johnstown Flood." This disastrous flood occurred on 31 May 1889, and was the result of the destruction of a dam across South Fork, a small branch of the Conemaugh River. Heavy rains had fallen and the mountain streams of the vicinity had become roaring torrents. The dam kept back the waters of Conemaugh Lake, about two and one half miles long, one and one half miles wide, and averaging over 50 feet in depth; in some places the water of the lake was 100 feet in depth. The direct distance from the city was about 12 miles, but along the river the distance was five or six miles longer. In a very short time after the dam had burst, the valley was flooded and

Johnstown and several small villages were under water. The loss of lives was 2,235 or more, and the loss of property was estimated to be about \$10,000,000. Aid for the sufferers came from all parts of the country; and the city was soon rebuilt, and its industries re-established. Pop. (1890) 21,805; (1900) 35,936.

Joint, in anatomy, an articulation or connection between bones. Many of the immovable joints are so close in their union that the two bones practically become one, as in the dovetailed sutures of the skull. In the make-up of a movable joint there are the two bones, and covering the surface of each a layer of tissue of rubbery consistency called cartilage; binding the bones together are firm inelastic bands of tissue called ligaments. Over the surface of the cartilage and the inner surfaces of the ligaments there is a thin smooth layer of tissue, the synovial membrane, which is kept constantly moist with an oily fluid to prevent friction. Joints are classified according to the variety of motions they allow: the freest is the ball-and-socket joint, as seen in the hip and shoulder.

Diseases of Joints.—Joint-diseases are distinguished by names that indicate the principal structure involved and the causes of disease. Where the cause is a specific disorder, as tuberculosis, rheumatism, syphilis or gonorrhœa, the name of that particular malady is given to the inflammation. The only structure of a joint that is apt to be involved alone is the synovial membrane, and inflammation of this structure is called synovitis. Inflammation of all the joint-structures is called arthritis, and where the bone is the primary seat of the trouble, or is principally involved, the name osteo-arthritis is used.

Synovitis.—This condition results from injuries (sprains, bruises, and wounds), from overuse, acting as an injury, and from poisons circulating in the blood. The joint is painful, moves with greater pain, and may be red outside. Blood-serum is poured out, and the synovial sac is distended. (This condition constitutes "water on the knee.") The general symptoms and severity depend on the cause of the trouble. Absolute rest of the joint and pressure by a snug bandage hasten recovery. When such injuries are repeated, or when the inflammation is slight but persistent, painting with iodine tincture may be of value. When the condition of inflammation reaches the suppurative stage all the structures of the joint are involved, and the condition is considered under the term "arthritis."

Arthritis (non-specific).—This is due to the extension of disease of contiguous bone, or it may result from wounds or in the course of various diseases. The joint becomes swollen, red, very painful, and the general symptoms are severe. When the poison is sufficiently virulent, suppurative arthritis results, and the pus collects in the synovial sac. (See INFLAMMATION.) In this condition the joint becomes "boggy," and the poisoning of the entire system is so severe as to warrant the most radical measures for relief. Opening the joint and allowing the escape of the pus, with thorough cleansing, may be sufficient, or the limb may have to be sacrificed. See ARTHRITIS; ARTHRITIS DEFORMANS; GOUT; RHEUMATISM; SYPHILIS.

JOINT GRASS — JOINVILLE

Knock-knee.—This is a deformity of the legs, consisting in the angular projection of the knee inward, and is sometimes called in-knee. It arises in children learning to walk who are affected with rickets (q.v.). The deformity is due to the faulty growth of the bones which enter into the joint. In early life, correction of it may be secured by splints and braces; but when the bones become less pliable, the femur, the tibia, or both may have to be severed by chiseling and the bones held in the normal line by plaster casts until union has taken place.

Charcot's Disease.—The peculiar form of arthritis thus named occurs in the course of locomotor ataxia, the knee-joint usually being the one affected. The joint swells painlessly, the structures are worn away, and the function of the joint is lost.

Injuries of Joints.—See DISLOCATION.

Sprains.—These are wrenches resulting in more or less stretching or laceration of ligaments, hemorrhage in and around the joint, and sometimes the displacement of tendons. The part usually swells at once, and movement causes severe pain. This injury may closely resemble a joint-fracture. Absolute rest of the joint must be insisted upon, as synovitis may follow. Alternating hot and cold applications, if started early, lessen the damage. The joint should then be snugly bandaged and kept so until swelling and tenderness disappear.

Wounds of Joints.—Injuries of this nature may cause damage directly to the structures or by infecting the joint and producing arthritis. Penetration into the synovial sac is indicated by an escape of the viscid fluid.

Floating Cartilages.—These are rarely seen except in the knee-joint, where they are ordinarily due to a small portion of cartilage being bitten off between the bones; this piece then floats around in the synovial sac, and causes trouble when the bones lock together on it. When this occurs, the patient falls to the ground because of the severe pain. The synovial membrane is injured, and is apt to be mildly inflamed. These bodies may sometimes be felt through the skin, and can be held, by holding the joint in the same position, until an opening is made; but ordinarily when the attacks become so frequent as to be unbearable the joint has to be opened and searched.

Joint or Knot Grass. See GRASSES IN THE UNITED STATES.

Joint-snake. See GLASS-SNAKE.

Joint Tenants, persons who hold or own lands jointly, by title created expressly by one and the same deed or will. It has been uniformly held by the courts that a unity of possession derived by several and distinct conveyances does not constitute a joint tenancy, but rather a tenancy in common. Joint tenants must have the same interest, derived from the same conveyance, commencing at one and the same time, and held by a united possession. The duration of the estates must be alike in both, and also the interest. Should one hold under the conveyance for a term of years, and the other for life, the possession even for a term of years would not be a joint tenancy. The estate must vest in each tenant at the same time. In the case of a will which gives one an interest to commence at a day named and another an

interest to commence a year later, no joint tenancy is created thereby. Should one receive an interest absolute and another an interest for life, the relation of joint tenants would not be created. The doctrine of survivorship is the distinguishing incident of title by joint tenancy. In the event of the death of one of the joint tenants, the survivor is entitled to the whole property, and the full title immediately vests in him. This is not an incident of tenancy in common. Many of the States of the Union have abolished title by survivorship in joint tenancy by constitutional provisions or by express statute enactments. In other States acts have been passed abrogating the distinction between joint tenants and tenants in common; and inheritance by survivorship not being an incident of tenancy in common, such acts are construed by the courts as abolishing such inheritance. Such acts do not apply to existing joint tenancies, but only to such as may be created after the enactment.

Joint-worm, the larva of chalcid flies (see CHALCIS) which make galls near the "joints" of grass-plants, and thus are sometimes of great injury to cereal crops, especially wheat and barley. See WHEAT INSECT-PESTS.

Jointure, join'tür, a settlement of lands and tenements made to a woman in consideration of marriage, as a substitute for dower. Originally it was a joint estate limited to both husband and wife as a joint tenancy and subjected to survivorship. The wife takes nothing under the settlement until after the death of the husband, unless special provisions are incorporated, which in reality modifies the effect of a regular jointure. In some settlements, denominated jointures, provisions are inserted to the effect that they are not to exclude enjoyment of dower; but such provisions are an innovation upon the established province of jointures. A good jointure must provide that it shall take effect, in possession and profit, immediately after the death of the husband; that it shall be for the life of the wife herself, and cannot be left in trust for her use and benefit. It should be provided that it is in settlement of all dower interest, in order to maintain its distinctive features of jointure. The settlement must be executed before marriage, as marriage constitutes the entire consideration for the jointure. Such an instrument properly executed before marriage is binding on the wife and a complete bar to dower in any dowable lands owned or conveyed by the husband during the marital relations. Without the intervention and assistance of legislative action, no other form of agreement is effectual to bar dower. It sometimes happens that the wife is deprived of her jointure by lawful acts to which she is not a party, as by the lands being taken for public purposes, or in some other manner equally legitimate. In such a case the settlement does not bar her claim against the husband's estate to the extent to which she is deprived of her jointure.

Joinville, Jean, zhōñ zhwān-vēl, SIEUR DE, French historian: b. Champagne 1224; d. 11 July 1317. He early entered the service of Thibaut, king of Navarre, and in 1248 raised a troop of 9 knights and 700 armed soldiers, and accompanied Louis IX. in his first crusade to

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the Holy Land. He rose high in favor with Louis, shared his captivity, returned with him to France in 1254, and spent much of his time at court. His 'Histoire de St. Louis,' which is one of the most valuable specimens of early French prose, has been often reprinted.

Jokai, yō'kä-i, **Maurus**, Hungarian novelist: b. Komorn 19 Feb. 1825; d. Budapest 5 May 1904. In 1846 he received his advocate's diploma, but never practised, and from a very early age devoted himself to literary work. In 1842 he produced a drama, 'The Jew Boy,' in 1846 his first novel, 'Work-Days,' was published, and in 1847 he issued a collection of stories entitled 'Flowers of the Desert.' His 'Revolution and Battle Pictures' appeared in 1849, and after that he devoted himself with extraordinary energy to journalistic and literary work, producing in all more than 300 volumes. He was a member of the Hungarian parliament and the recognized leader of the Liberal opposition since the restoration of the constitution, and in 1897 was appointed a life member of the House of Magnates. He was a successful newspaper editor continuously from 1858 till his death, his last paper being the 'Nemzet' (Nation). He is best known by his numerous romances and novels. Among the latter are 'Transylvania's Golden Age' (1851); 'The Man with Two Horns' (1852); 'The Turks in Hungary' (1852); 'A Hungarian Nabob' (1854); 'Kárpáthy Zoltan' (1855); 'Political Fashions' (1861); 'The New Landlord' (1862); 'Dr. Dumany's Wife' (Eng. trans. 1891); 'In Love With the Czarina' (Eng. trans. 1894); 'The Nameless Castle' (Eng. trans. 1891); 'The Green Book' (Eng. trans. 1897); 'The Lion of Janina' (Eng. trans. 1897); 'The Poor Plutocrats' (Eng. trans. 1899); 'Debts of Honor' (Eng. trans. 1900); 'The Baron's Son' (Eng. trans. 1900); 'The Day of Wrath' (Eng. trans. 1900). His best plays are: 'King Koloman' (1855); 'Manlius Sinister' (1856); 'Georg Dózsa' (1858); 'The Martyrs of Szigetvár' (1859); and 'Milton' (1878). His 'Political Poems' appeared in 1880. In his novels Jokai has been chiefly influenced by French schools, formerly by Hugo, latterly by Zola. Consult Nevai, 'M. Jokai' (1894).

Joliet, Charles, shär'l zhō-lé-ä, French journalist and miscellaneous writer: b. St. Hippolyte-on-the-Doubs 8 Aug. 1832. He has contributed to every periodical of note in Paris, and has published an extraordinary number of books, among which may be noted 'The Athenians,' poems; 'The Story of Two Young Wives,' a novel (1866); 'Mademoiselle Cherubin' (1870); 'Trois Uhlan's' (1872); 'Roman incoherent: Scènes de la vie d'artiste' (1887).

Joliet, jō'lé-ät, Fr. zhō-lé-ä, **Louis**, American explorer: b. Quebec 21 Sept. 1645; d. Canada May 1700. He was educated at the Jesuit College of Quebec, and subsequently engaged in the fur trade on the western frontier, thereby becoming familiar with the missionaries, and with the habits and languages of various Indian tribes. Such was his reputation for prudence and experience that he was selected by the governor Frontenac to ascertain the direction and mouth of the Mississippi, a few of whose affluents had already been visited by mission-

aries and traders. Starting with his companion, the illustrious Father Marquette (q.v.), and five other Frenchmen, from Green Bay in June 1673, he ascended the Fox River, and descended the Wisconsin to its confluence with the Mississippi, down which they sailed as far as the country of the Chickasaws, below the entrance of the Arkansas. Having ascertained with tolerable accuracy the general course of the stream, they returned to Green Bay, by the way of Illinois River, Chicago, and Lake Michigan, whence Joliet started alone for Quebec. The whole route traveled by them is estimated at 2,500 miles. He lost his journal and other papers in the rapids above Montreal, but wrote out from recollection a few pages of manuscript, which agree with the narrative of Marquette. In the same manner he prepared a map of the region explored. The French government inadequately rewarded him for his services with the island of Anticosti at the mouth of the St. Lawrence, where he built a house and fort for his family, intending to embark in trade. He appears, however, to have been subsequently employed in the West. In 1691 his island was captured by a British fleet and his property destroyed. In 1697 the seignory of Joliet, Canada, was assigned to him. Joliet, the capital of Will County, Ill., is named after him. Consult: Parkman, 'La Salle' (1869); Winsor, 'Narrative and Critical History of America' (1884-7).

Joliet, jō'lé-ät, Ill., city, county-seat of Will County; on the Des Plaines River, and on the Chicago, R. I. & P., the Michigan C., the Atchison, T. & S. F., the Elgin, J. & E., the Lake Shore & E., and the Chicago & A. R.R.'s; about 30 miles southwest of Chicago. The first permanent settlement was made in 1831 and the city was chartered in 1859. The place was named in honor of Louis Joliet, a Canadian navigator and one of the party who with Marquette visited this place in 1673. The Illinois and Michigan Canal and the Joliet River supply the city with good water power. The city is situated in a rich agricultural region, and large limestone quarries are in the vicinity. Its chief manufacturing establishments are the American Steel and Wire Company works, the Illinois Steel Company factory, the American Tin Plate Company, machine-shops, agricultural implement works, foundry and furnace products, breweries, flour-mills, boot and shoe factories, and furniture factories. Some of the public institutions are the State penitentiary, Silver Cross and Saint Joseph's hospitals, Saint Mary and Saint Francis academies, and a public library which contains about 16,000 volumes. The Illinois Steel Company Atheneum, a club-house for workingmen, is a fine institution. Several of the churches and public schools are good buildings. The city owns and operates the waterworks. Pop. (1890) 23,264; (1900) 29,353.

Jolly Balance, a spring balance devised by Prof. Philipp von Jolly, of the University of Munich, for determining the specific gravities of small objects. In its usual form it consists essentially of a long spiral spring of fine wire, to the lower end of which two pans are attached, one above the other. The lower pan is kept immersed in water, while the upper one remains in the air. The object whose specific gravity is to be determined is placed in the upper

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pan first, and the extension of the spring due to the weight of the object in the air is noted. The specimen is then transferred to the lower pan (where it will be under water), and the extension of the spring under these new conditions is also noted. The specific gravity of the specimen is then obtained by dividing the extension of the spring when the object is in the air by the difference between the two extensions as observed for air and water, respectively. The extension of the spring is observed by means of a graduated scale engraved upon a mirror that is placed back of the spring, and parallel to it. In taking a reading, the eye is brought into such a position that the image of the pupil is seen in the mirror directly behind the image of the pointer at the lower end of the spring. In this way errors of parallax are avoided in the readings. The Jolly balance is chiefly used for the rapid determination of the specific gravities of minerals and similar objects, where great precision is not essential.

Jonah, jō'na, a Hebrew prophet: b. Gath-hepher, Galilee. He flourished in the early years of Jeroboam II., king of Israel, who acceded to the throne 781 B.C. In 2 Kings xiv. 20 we are told that Jonah predicted to Jeroboam his victories over the Syrians. In the narrative of this so-called prophecy of Jonah we see the son of Amitai despatched on an errand of unique importance. He is to go to Nineveh to warn the inhabitants of the destruction of their city, which is to follow within 40 days. The Assyrians at that time were in a reduced condition, their power was broken, and they were inclined to heed the warning. A fast was proclaimed and the threatened judgment was thus averted. Chapter 1st of the book tells the story of Jonah's refusal to obey the command to go to Nineveh; his flight westward, his miraculous arrest, ending in his imprisonment in the belly of a large fish. Then follows a psalm of thanksgiving for deliverance from the fish. The 3d chapter relates to the preaching of Jonah and the repentance of the Ninevites followed by the reprieve of their city. Finally Jonah is rebuked for his anger at the sparing of Nineveh, by which his prophetic reputation ran the risk of being discredited. The book is in no proper sense a prophecy, but is intended to rebuke the haughty exclusiveness of Israel. The Jews were inclined to rejoice at the calamities of the heathen, and the present reprimand is all the more severe because the Assyrians had been and were afterward again to be the most powerful and dangerous foe to the peace of Palestine.

Jonah Crab, a crab of southern New England (*Cancer borealis*) related to the common edible species, but more robust, and with a thicker, harder shell. It is eaten locally.

Jo'nas, Benjamin Franklin, American lawyer and politician: b. Williamston, Ky., 19 July 1834. He was graduated from the law department of the University of Louisiana in 1855, and on the outbreak of the Civil War entered the Confederate army as private and rose to the rank of adjutant. In 1865 he was elected to the Louisiana legislature, to the State senate in 1872, and was then chosen city attorney of New Orleans. After a second term in the State legislature, he was elected to the United States Senate from Louisiana and served from 1879

to 1885. He was appointed by President Cleveland collector of the port of New Orleans (1885-9).

Jonas, yō'nās, **Justus** (originally **Joest Koch**), German religious reformer: b. Nordhausen, Saxony, 5 June 1493; d. Eisfeldt 9 Oct. 1555. He accompanied Luther to the diet at Worms, assisted him in translating the Old Testament, took part in the Marburg Conference as well as in drawing up the so-called articles of Torgau and was present at the Diet of Augsburg. He did good service to the cause of the Reformation not only by his preaching but by his vigorous translations into German of the Latin works of Luther and Melanchthon.

Jon'athan, son of Saul, king of Israel. He carried on the war against the Philistines for some time with victorious success, but in the battle of Gilboa (1033 B.C.) was slain. His friendship for David is one of the most beautiful incidents in Old Testament history, and the elegy or dirge composed by David on his death—'The Song of the Bow'—is in the highest strain of Hebrew poetry.

Jonathan. See BROTHER JONATHAN.

Jones, Alexander, American inventor and journalist: b. North Carolina about 1802; d. New York 25 Aug. 1863. He studied medicine in Philadelphia, entered practice in Mississippi, there became interested in cotton cultivation, and made important improvements in the cotton-gin which soon were in general use at the South. In 1840 he was invited by the East India Company to visit India and develop cotton culture there, but declined. He invented also a street-sweeping machine. He became an agent of the Associated Press in 1850, and subsequently commercial reporter of the New York *Herald*. His published volumes are: 'Cuba in 1851' (1851); 'Historical Sketch of the Electric Telegraph' (1852); and 'The Cymri of '76' (1855).

Jones, Alfred Gilpin, Canadian statesman: b. Weymouth, Nova Scotia, September 1824. After a secondary education, he entered mercantile life, opposed confederation in 1865, sat in the Dominion Parliament for Halifax in 1867-72 and again in 1874-8, was a member of the privy council, and in 1878 was minister of militia. In 1887-91 he was a third time in Parliament. At first a Conservative, he later identified himself with the Liberals, and favored a trade-union with the United States.

Jones, Amanda Theodosia, American poet: b. East Bloomfield, Ontario County, N. Y., 19 Oct. 1835. Some of her war songs were very popular. She published: 'Ulah and Other Poems' (1860); 'Atlantis and Other Poems' (1866); 'A Prairie Idyl, and Other Poems' (1882).

Jones, Anson, last president of the Republic of Texas: b. Great Barrington, Mass., 20 Jan. 1798; d. Houston, Texas, 7 Jan. 1858. He commenced the study of medicine in Litchfield, Conn., in 1817, and in 1820 was licensed to practise. He established himself in 1833 in Brazoria, Texas, and upon the outbreak of the troubles between Texas and Mexico, became one of the earliest advocates of the severance of the two countries. In the succeeding war of independence he served as a private soldier, and as surgeon in the Texan army. In 1837-8 he

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was a representative in the Texan congress from Brazoria County; in 1838 was sent as minister to Washington, where he endeavored, though unsuccessfully, to secure the annexation of Texas to the United States, and on his return to Texas took his seat in Congress as senator from Brazoria, and in 1841 was appointed by President Houston his secretary of state, which office he filled three years. In September 1844 he was elected President of Texas for three years from the ensuing December, and held that office until the annexation of Texas to the United States. He succeeded in maintaining a footing of equality in negotiations with England, France, and the United States; and by the intervention of the two former powers the government of Mexico was induced to acknowledge the independence of Texas.

Jones, Charles Colcock, Jr., American author: b. Savannah, Ga., 28 Oct. 1831; d. 19 July 1893. He was graduated at Princeton (1852), at Harvard Law School (1855), and was admitted to the bar in 1856. He served as colonel of artillery in the Confederate army during the War for the Union, and on the return of peace removed to New York, where he practised law. In 1877 he returned to Georgia and devoted his time to the study of the history and archaeology of that State. He wrote: 'Negro Myths from the Georgia Coast, Told in the Vernacular' (1888); 'The History of Georgia' (1883).

Jones, David Phillips, American naval engineer: b. Philadelphia 1841; d. Pittsburg 30 Jan. 1903. He entered the navy in 1862, during the Civil War took part in the operations on the James (Va.) and the St. John's (Fla.), and was present at Bermuda Hundred, and in 1869 attained the grade of chief engineer. In 1874-9 he was instructor in steam engineering at the Naval Academy, Annapolis, and from 1889 to 1892, when he was retired, was on duty at the naval training-station at Newport, R. I. He was chief inspector of steel for the district at Pittsburg during the Spanish-American war.

Jones, Edward Franc, American soldier and manufacturer: b. Utica, N. Y., 3 June 1828. He was colonel of the 6th regiment of Massachusetts volunteers, which he led through Baltimore at the opening of the Civil War, and which was attacked by the mob. He was subsequently brevetted a brigadier-general of United States volunteers. He was a member of the Massachusetts Legislature in 1865, but removed to Binghamton, N. Y., the same year. He was lieutenant-governor of New York 1886-91, and originated the familiar phrase, "He pays the freight." He published 'The Origin of the Flag': etc.

Jones, Henry Arthur, English dramatist: b. Grandborough, Buckinghamshire, England, 28 Sept. 1851. After a secondary education, he took up writing as a means of livelihood, and in 1879 appeared as playwright with 'A Clerical Error,' performed by Wilson Barrett at the Court Theatre. He followed this by a series of comedies of modern life, clever in dialogue and stagecraft, which have been very popular, particularly with English audiences. They include: 'Silver King' (1882); 'Saints and Sinners' (1884); 'Middleman' (1889); 'Judah' (1890); 'The Dancing Girl' (1891); 'The Tempter' (1893); 'The Masqueraders' (1894);

'The Triumph of the Philistines' (1895); 'The Rogue's Comedy' (1896); 'The Liars' (1897); 'The Manœuvres of Jane' (1898); 'Carnac Sahib' (1899); 'The Princess' Nose' (1902); 'Chance the Idol' (1902).

Jones, Inigo, English architect: b. London July 1573; d. there 21 July 1652. He was the son of a clothworker and began life as a carpenter, but showing a taste for painting, William, earl of Pembroke, supplied him with the means of visiting Italy for the purpose of studying landscape painting. At Venice, the works of Palladio inspired him with a taste for architecture. He was appointed first architect to Christian IV., king of Denmark, but in 1605 he returned to his native country. After being employed for a time as a scenic and stage artist, he was appointed in 1610 surveyor of the works to Henry, Prince of Wales. After the death of the prince he again visited Italy, and extended his knowledge and improved his taste from the examination of the models of ancient and modern art. The banqueting house at Whitehall is a monument of his skill and science. At Winchester Cathedral he erected a screen in the style of classic antiquity. Like Wren he seems not to have duly appreciated the Pointed style of building. He built the front of Wilton House, in Wiltshire, for Philip, earl of Pembroke, and was much employed by the court and by many of the nobility and gentry. He also designed the scenery and decorations for masks—a species of dramatic entertainment fashionable in the early part of the 17th century. In these pieces the dialogues and songs were composed by Ben Jonson, who quarreled with Jones, and abused him in epigrams and satires. Being a Roman Catholic, and a partisan of royalty, he suffered in the civil war, and in 1646 was forced to pay a heavy fine as a malignant or cavalier. As an author he is known by a work on Stonehenge, composed by command of King James I., in which he undertook to prove that Stonehenge was erected by the Romans, and was a hypæthral temple dedicated to the god Cœlus. He was the reviver of classical architecture in England, but he blended Gothic elements with the Italian style. Among his works besides those mentioned are the Greenwich Hospital, the old London Exchange, and the portico of St. Paul's Church, and Earl Pembroke's house.

Jones, Jacob, American naval officer: b. near Smyrna, Del., March 1768; d. Philadelphia 3 Aug. 1850. He entered the United States navy in 1799 as a midshipman and while serving in the war with Tripoli, was captured in 1803 and held a prisoner for 18 months. In 1812 he became commander of the Wasp and with her captured the English brig Frolic 18 Oct. 1812, but on the following day encountered the English war vessel Poictiers, 74 guns, by which both the Wasp and its prize were taken. He was released on parole at Bermuda and for his victory over the Frolic was voted a gold medal by Congress, and \$25,000 was granted to him and his crew in payment of the personal loss they had sustained. He subsequently commanded squadrons in the Mediterranean and the Pacific.

Jones, Jenkin Lloyd, American Unitarian clergyman: b. Llandyssil, Cardiganshire, Wales, 14 Nov. 1843. He came to America with his

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parents while an infant, served in a Wisconsin regiment during the Civil War, and was graduated from the Meadville (Pa.) Theological Seminary in 1870. He was pastor of All Souls Unitarian Church, Janesville, Wis., 1874-83; was secretary of the Western Unitarian Conference for nine years, and since 1883 has been pastor of All Souls Church, Chicago. He has been prominent among the more radical members of the Unitarian body and has published: 'The Faith that Makes Faithful,' with W. C. Gannett (1886); 'Practical Piety' (1890); 'Word of the Spirit' (1897); 'Bits of Wayside Gospel' (1899); etc.

Jones, John, American surgeon: b. Jamaica, L. I., 1729; d. 1791. He studied medicine in Europe and returning to America practised in New York, becoming professor of surgery in King's College, and, with Dr. Bard, founding the New York Hospital in 1771. After the occupation of New York by the English forces in 1777 he removed to Philadelphia, there being one of the physicians of the Pennsylvania Hospital, and in 1787 vice-president of the College of Physicians. He was the friend and physician of both Washington and Franklin, attending the latter in his last illness. He published, 'Plain Remarks upon Wounds and Fractures' (1775).

Jones, John Edward, American journalist: b. Washington, D. C., 21 Feb. 1867. He was educated in Georgetown and Columbian Colleges, was a delegate to the Republican National Convention in 1900 and served as assistant secretary to the Republican National Committee.

Jones, John Paul, American sailor: b. Arbigland, Scotland, 6 July 1747; d. Paris 18 July 1792. His family name was Paul, the name of Jones being assumed later. At 12 he was bound apprentice to a merchant of Whitehaven, in the American trade. His first voyage was to Virginia, where his elder brother was established as a planter. He was then engaged for some time in the slave-trade, but quitted it in disgust; was afterward in command of the *Betsy* of London, and remained some time in the West Indies, engaged in commercial pursuits and speculations. In 1773 he was in Virginia, arranging the affairs of his brother, who had died intestate and childless, and about this time took the name of Jones. On the outbreak of the Revolution he offered his services to Congress and when the naval force was organized he was appointed senior lieutenant on the flagship *Alfred*, and with a small squadron sailed to the Bahamas, where they did considerable injury to British shipping; in May 1776 he was appointed to command the *Providence*, a small vessel, and cruising from Bermuda to Nova Scotia captured 16 prizes in less than seven weeks and destroyed the shipping and fishery at Canso and the Isle Madame, Nova Scotia. Later in that year he made a second cruise in the *Alfred* and captured a number of vessels of the Cape Breton coal fleet and destroyed fishing vessels. At this time he earnestly advocated in letters to Congress the development of the American navy; urging the need of cruising in small squadrons on the enemy's coast, where shipping was inadequately protected, thus diverting the attention of the enemy and drawing their force from the

American coast. In 1776 he was made captain, but 13 officers were given seniority over him; Jones protested against this as an injustice, but in vain. In 1777 he was assigned to the command of the *Ranger* with orders to cruise along the British coast; on this ship he raised the new American flag, the Stars and Stripes, for the first time in the history of the navy; he went first to France to convoy some merchant vessels to Quiberon Bay, where they were placed under the protection of a French fleet; here he obtained a salute to the American flag from the French. He also carried to France the despatches with the news of Burgoyne's surrender. In April 1778, he left Brest and sailed for Whitehaven, England, where he spiked the guns of the fort but failed to burn the shipping in the port, as he had planned; a few ships only were destroyed. He also attempted to capture the earl of Selkirk, but failed on account of the earl's absence from his estate; his crew took a part of the family plate, but this was afterward bought up by Jones and restored to Selkirk. Later on this cruise the *Ranger* met the *Drake*, a ship of superior armament, and after a short fight compelled her surrender, and took her as a prize into Brest. Jones was then promised the command of a squadron by the French and waited in France till February 1779, when he was finally given command of the *Duras*, a name which he changed to the *Bonhomme Richard*, and in August of that year he sailed from France with a squadron of five ships including his own, being later joined by two French privateers. He cruised about the Irish and English coasts, and captured 26 vessels; he was continually harassed by the insubordination of some of his officers, especially Capt. Vandais of the *Alliance*; three of his squadron, including the two privateers parted company in the early part of September. On 23 September, when off Flamborough head, he sighted the Baltic fleet under convoy of the *Serapis* and the *Countess of Scarborough*, and after a long and desperate fight the *Serapis* surrendered to the *Bonhomme Richard*, the *Scarborough* being taken by the *Pallas*. The *Richard* sunk the next day, but the *Serapis* was taken into port. (For account of the battle see **BONHOMME RICHARD**.) The sensation produced by this victory was very great, and his reception at Paris, whither he went on the invitation of Franklin, was of the most flattering kind. The king presented him with a gold sword, and invested him with the military order of merit. On his return to America in 1781 Congress highly complimented him for his zeal, prudence, and intrepidity, voted him a gold medal, and promised him the command of a new ship then building, which was, however, given to France. He subsequently went on board the French fleet, where he remained until the conclusion of peace, and then went to Paris as agent for prize-money. He afterward was invited into the Russian service, with the rank of rear-admiral, but owing to a quarrel with the admiral and intrigues at court soon retired from the service. He returned to Paris where he died. A public funeral was given him by the National Assembly.

The exact place of his burial in Paris was for a long time unknown. In October 1899, a search for it was commenced by several learned

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societies; the merit of locating the site is mainly due to Monsieur de Ricaudy who found the correspondence of the gatekeeper of the cemetery for foreign Protestants. This shows that Jones was buried in a small cemetery northwest of the Hospital St. Louis, at the corner of the Rue des Ecluses Saint-Martin and the Rue de la Grange aux Belles; the cemetery was closed in 1793, and the site is now occupied by unimportant buildings. There is no documentary evidence to prove that Jones was buried in a lead coffin or in naval uniform, the buttons or sword of which might serve for identification, so that it is probable that identification is impossible.

Consult: Buell, 'John Paul Jones, the Founder of the American Navy'; Hapgood, 'Paul Jones'; Brady, 'Commodore Paul Jones'; Laughton, 'Studies in Naval History.'

Jones, John Percival, American politician: b. Herefordshire, England, 1830. He came to the United States in 1831, was educated in the schools of Cleveland, Ohio, in the early days of California gold-mining went to that State where he acquired mining interests, and in 1863-7 was a member of the State senate. In 1867 he removed to Nevada, where he became a proprietor and the superintendent of the "Crown Point" silver mine, through which he realized a fortune. He was elected to the United States Senate from Nevada in 1873, and this office he held by re-election until 1903. He was originally a Republican, was elected to the Senate as a "Silverite" in 1897, and from 1900 was a "Silver" Republican. In 1896 he was an advocate of the election of W. J. Bryan, but not so in 1900. During his service in the Senate he was an important member of the Committee on Mines and Mining.

Jones, John William, American Baptist clergyman and author: b. Louisa, Va., 25 Sept. 1836. He was graduated from the University of Virginia in 1859 and from the Southern Baptist Theological Seminary, and during the Civil War served as private and then chaplain in the Confederate army. He was pastor of a Baptist church in Lexington, Va., 1865-71, and chaplain of Washington College during Lee's presidency, and since the last named date has been successively agent of various Southern institutions, chaplain of the University of Virginia, and pastor of several churches. Besides editing 14 volumes of the 'Southern Historical Papers' he has published 'Personal Reminiscences, Anecdotes and Letters of R. E. Lee' (1874); 'Christ in the Camp, or Religion in Lee's Army'; 'Memorial Volume of Jefferson Davis'; 'School History of the United States'; etc. He has delivered many historical lectures, and is the chaplain general of the United Confederate Veterans. He was for 12 years secretary of the Southern Historical Society, and is now secretary and superintendent of the general Confederate Memorial Association with headquarters in Richmond, Va.

Jones, Joseph Stevens, American playwright: b. 1811; d. Boston, Mass., 30 Dec. 1877. After his graduation from the Harvard Medical School in 1843, he practised medicine for several years; but was subsequently proprietor and manager of the Tremont, Old National, and other theatres in Boston at various times. Among the nearly 200 plays of which he was the author may

be named: 'Solon Shingle'; 'The Liberty Tree'; 'The Siege of Boston'; 'Moll Pitcher'; 'The Last Dollar'; 'The People's Lawyer'; 'Paul Revere'; 'The Silver Spoon.'

Jones, Leonard Augustus, American jurist: b. Templeton, Mass., 13 Jan. 1832. He was graduated from Harvard in 1855 and from Harvard Law School in 1858. He was admitted to the Suffolk bar in 1858 and since 1884 has been one of the editors of the 'American Law Review.' Among his many legal works are: 'Law of Mortgages and Real Property' (1878-94); 'Law of Mortgages of Personal Property' (1881-94); 'Law of Easements' (1898). He was appointed judge of the court of land registrations in 1898.

Jones, Owen, English architect: b. London 15 Feb. 1809; d. there 19 April 1874. In 1834 he traveled in Spain and studied the art monuments of Granada, after which he visited Egypt. On returning to England he published his great work on the Alhambra. In 1851 he undertook the decoration of the Crystal Palace at the first Universal Exhibition. He also furnished the various courts of different architecture, notably the "Alhambra Court." His researches and publications had a wonderful influence on the decorative art of England, especially his 'Grammar of Ornament' in which he illustrated the decorative devices of all nations. He published: 'Plans, Elevations, Sections and Details of the Alhambra' (1845).

Jones, Samuel M., American manufacturer and politician: b. 3 Aug. 1846 in Wales, d. Toledo, Ohio, 12 July 1904. He came to the United States with his parents, when three years old; at 18 he was working in the oil-fields of Titusville, Pa. In 1893 he invented improved oil well apparatus and set up the Acme Sucker Rod Factory in Toledo, Ohio. Here he introduced reforms in the condition of his employees, fixed a minimum wage, gave an eight-hour day, and introduced a system of profit-sharing; he also opened a pleasure ground adjoining the factory known as "Golden Rule" Park. In 1897 he was nominated for mayor of Toledo by the Republican party and elected; but his subsequent advocacy of municipal ownership of public utilities and of the abolition of the system of private contract in doing city work alienated the support of his party. His administration was, however, very popular, and he was re-elected as independent candidate in 1899 and 1901. In 1900 he was non-partisan candidate by petition for governor of Ohio, but was defeated.

Jones, Samuel Porter, commonly known as SAM JONES, American Methodist revival preacher: b. Chambers County, Ala., 16 Oct. 1847. He was admitted to the Georgia bar in 1869, but his drinking habits put an end to his career as a lawyer. Becoming converted in 1872 he was admitted to the ministry of the Methodist Church South, the same year, and has since devoted himself to evangelistic work, his marked eccentricities of speech and manner probably contributing somewhat to his popularity. He has published: 'Sermons and Sayings'; 'Music Hall Sermons'; 'Sam Jones' Own Book'; etc

Jones, Thomas ap Catesby, American naval officer: b. Virginia 1787; d. 1858. Having entered the navy in 1805, he was employed in

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police duty in the Gulf, saw service in the latter part of the War of 1812, and was unsuccessful in an attempt to prevent the passage of Vice-Admiral Cochrane's fleet across Lake Borgne. In 1826 he was sent to the Hawaiian Islands to settle the difficulties arising through the efforts of a local party to make the islands a British dependency. Upon the declaration of war between the United States and Mexico, he feared that the British man-of-war Dublin intended the annexation of California, and imprudently landed at Monterey and took possession. He was therefore removed temporarily from his command.

Jones, Sir William, English lawyer and Oriental scholar: b. London 28 Sept. 1746; d. Calcutta 27 April 1794. He was educated at Harrow and Oxford, and early acquired a reputation as a linguist, Hebrew, Persian, Arabic, and even Chinese, besides German, Italian, French, Spanish, and Portuguese, being among his acquisitions. In 1770 his translation (in French) of the life of Nadir Shah from the Persian appeared; in 1771 his grammar of the Persian language; in 1774 his 'Poeos Asiaticæ Commentariorū Libri Scx.' and in 1781 his translation of the seven Arabic poems known as the 'Moallakat.' He had been called to the bar in 1774, and in 1783 was nominated judge in the supreme court of judicature, Bengal, and knighted. Here he did much for the furtherance of Oriental studies, being one of the first Europeans to study Sanskrit, founding the Royal Asiatic Society, in 1784 translating the Sakuntala, the Ordinances of Manu, besides tales, poems, extracts from the Vedas, etc. He also undertook a digest of the Hindu and Mohammedan laws, which he did not, however, live to complete.

Jonesboro, jōnz'bür-ō, Ark., city, county-seat of Craighead County; on the Kansas City, Ft. S. & M., the St. Louis S. W., and the Jonesboro L. E. R.R.'s; about 120 miles northeast of Little Rock. It was first settled in 1870, although some settlements had been made earlier on farms in the vicinity. It was incorporated in 1882. It is situated in an agricultural and lumbering region, and the railroad facilities make it the trade centre for quite an extent of country. The chief manufactures are flour, lumber, staves and headings, boxes, and wagons. In addition to the manufactures there is considerable trade in grain, live stock, and some dairy products. Pop. (1890) 2,065; (1900) 4,508.

Jonesboro, Ga., city, county-seat of Clayton County; on the Central of Georgia railroad; about 16 miles south of Atlanta. It is situated in a fertile agricultural region, but its nearness to Atlanta and lack of water power are hindrances to manufacturing. Its chief trade is in fertilizers, cotton, and farm products. At this point, August 1864, was fought a hotly contested battle with Gen. Howard of Sherman's army, in command of the Federal troops, and Gen. Hardee of Hood's army, in command of the Confederates. See JONESBORO, BATTLE OF.

Jonesboro, Battle of, and Fall of Atlanta. After the battle of Ezra Church (q.v.), 28 July 1864, Gen. Sherman, unable fully to invest Atlanta, drew the Fourteenth corps and Schofield's Army of the Ohio from the left, and extended his lines on the right nearly to East Point, about six miles below Atlanta, the

junction of the two railroads leading from the south, upon which the city and Hood's army depended for supplies. Hood made a corresponding movement to cover the roads, meeting Sherman's advance with strong, well-intrenched lines, and, 6 August, severely handling two of Schofield's brigades that had crossed Utoy Creek, killing and wounding over 300 men and taking two colors. To compel Sherman to relinquish his movement and raise the siege of Atlanta, Hood, 10 August, sent Wheeler with about 5,000 cavalry to operate upon his line of communication with Nashville. Wheeler moved promptly, struck and destroyed the railroad near Marietta, Calhoun, Adairsville, and Dalton, captured over 1,000 head of beef-cattle and other supplies, and, after demonstrating on Dalton and Resaca, was driven into East Tennessee. Sherman had issued an order, 16 August, for a general movement on the 18th upon the West Point and Macon railroads, for the purpose of forcing Hood from Atlanta, but hearing of Wheeler's raid, he suspended the order, and directed Gen. Kilpatrick, with 5,000 cavalry, to move on the night of the 18th against the West Point and Macon roads and destroy them completely. Kilpatrick started from near Sandtown, crossed the West Point road at Fairburn, and struck the Macon road a short distance north of Jonesboro, some 26 miles from Atlanta, where he encountered Ross' brigade of cavalry, which was driven through Jonesboro. But little of the railroad had been destroyed when Jackson's brigade of cavalry and an infantry brigade, coming up from the south, compelled Kilpatrick to retreat. Making a circuit, he again struck the railroad at Lovejoy's, about six miles south of Jonesboro, and encountered a Confederate force, through which he cut his way and reached Decatur, near Atlanta, on the 22d. As Sherman was satisfied that Kilpatrick had not greatly damaged the railroad, he renewed his order for the movement of the whole army. On the night of the 25th the siege of Atlanta was raised. The sick and wounded, spare artillery, and surplus transportation were sent back to the Chattahoochee bridge; Stanley's Fourth corps drew out from the left and moved to the right, closing up with the Fourteenth near Utoy, and the Twentieth corps fell back to an entrenched position covering the Chattahoochee bridge and the hospitals. On the night of the 26th the Army of the Tennessee (Gen. Howard) drew out, rapidly made a wide circuit, and came up on the right of the Army of the Cumberland, under Gen. Thomas, along Utoy Creek, facing south. The Army of the Ohio remained in position, now on the extreme left. On the 28th, making a general left wheel, pivoting on Schofield's army, both Thomas and Howard reached the West Point road extending from East Point to Red Oak and Fairburn, Schofield closing in upon the left of Thomas, but a short distance from the Confederate works covering the junction of the road at East Point. The next day was devoted to the railroad, of which nearly 13 miles was destroyed, and on the 30th the entire army moved eastward for the Macon railroad. Schofield, on the left, approached it near Rough and Ready, and presented a bold front toward East Point; Thomas, in the centre, reached Couch's, on the Fayetteville and Decatur road, with but little opposition; and Howard, on the right, driving before him the enemy's cavalry, saved the bridge

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over Flint River after a sharp engagement, then, crossing part of his command, halted at night within half a mile of Jonesboro. On the morning of the 31st Howard, finding himself in the presence of a large force, disposed the Army of the Tennessee for battle and intrenched. Logan's Fifteenth corps on the left, Ransom's Sixteenth corps on the right, and Blair's Seventeenth corps in rear of Logan's left. When Sherman began his movement on the night of the 25th S. D. Lee's corps of Hood's army covered the railroad from near Atlanta to a place nearly a mile south of East Point. Hardee's corps was on Lee's left, while Hood held Atlanta with Stewart's corps and the Georgia militia. Hood had been deceived; he knew of Sherman's earlier movement, but misinterpreted it as preliminary to a retreat across the Chattahoochee; but when undeceived on the 30th, he ordered Hardee with his own corps and Lee's to move rapidly to Jonesboro and crush Howard on the morning of the 31st. Hardee, who was near Rough and Ready, four miles below East Point, began moving about 4 P.M., followed later by Lee, and at noon of the 31st both were in Howard's front. At 3 P.M. Hardee attacked with Lee's corps and part of his own, under Cleburne, with the expectation of driving Howard into the river, and for two hours the fighting was severe, but Hardee was repulsed. Lee, who, on the Confederate side, bore the brunt of the fight, says: "The attack was a feeble one and a failure, with a loss to my corps of about 1,300 men killed and wounded." Hardee's entire loss was about 1,700. The Union loss was 179 killed and wounded, almost entirely of Logan's corps.

When Sherman heard the noise of this battle he was with Thomas, who, with Schofield, had reached and was destroying the road from Rough and Ready southward. Thomas and Schofield were marched to the assistance of Howard, and Kilpatrick was sent down the western bank of the Flint to strike the road south of Jonesboro. Davis' Fourteenth corps joined Howard's left at noon of 1 September, relieving Blair, who was disposed to support Kilpatrick. Lee's corps had gone, but Hardee's was still in position and intrenched, covering Jonesboro on the north. At 4 P.M. Davis charged Hardee's works and, after a hard fight, carried parts of them, capturing Gen. Govan and the greater part of his brigade and two batteries of four guns each. Stanley and Schofield reached the field too late to take part in the engagement. During the night Hardee retreated to Lovejoy's station, and next morning Sherman started in pursuit. The Union loss 1 September was 223 killed, 946 wounded, and 105 missing. The Confederate loss is not fully known; of the three divisions engaged Cleburne's sustained a loss of 55 killed, 197 wounded, and 659 missing. There is no return of losses in the other two divisions.

The result of the battle of Jonesboro was the fall of Atlanta. Six hours before Hood heard of the result of Hardee's attack 31 August, he sent an order to Lee to return in the direction of Atlanta, to make a movement on Sherman's flank, or to cover the evacuation of the city. Lee received the order at midnight, and was halted next morning about six miles from Atlanta. Meanwhile Hood had heard of the result of Hardee's attack; its "failure necessitated the evacuation of Atlanta." Lee was ordered to

join Hardee, which he did on the 2d, and at 5 P.M. of the 1st Hood marched out of the city with Stewart's corps on the McDonough road; the Georgia militia was sent to Covington, and at night the rear-guard blew up some abandoned ammunition-trains. Slocum's Twentieth corps entered the city on the morning of the 2d. Sherman received the news on the 4th, and, turning his back on the Confederates at Lovejoy's, marched his army to East Point and Atlanta.

The campaign for Atlanta, which began 6 May 1864, was marked by brilliant flanking movements, on both sides, by almost uninterrupted skirmishing, growing at times to the dimensions of a battle, and by many heavy engagements, most of them of a desperate character. The Union losses in the entire campaign were 4,423 killed, 22,822 wounded, and 4,442 missing, a grand aggregate of 31,687. The Confederate losses were 3,044 killed and 18,952 wounded. Add to this the number of prisoners captured, 12,938, makes a grand aggregate of 34,979. Consult: "Official Records," Vol. XXXVIII.; Cox, "Atlanta"; Van Horne, "History of the Army of the Cumberland," Vol. II.; "Life of Gen. George H. Thomas"; Bowman, "Sherman and his Campaigns"; Sherman, "Personal Memoirs," Vol. II.; the Century Company's "Battles and Leaders of the Civil War," Vol. IV.

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Jonesville, jōnz'vīl, Va., the scene of a Civil War action. On 1 Jan. 1864 Major Beeres, who had been operating with a battalion of the 16th Illinois cavalry and a battery, near Cumberland Gap, attacked and drove a small Confederate cavalry force from Jonesville and occupied the place. On the morning of the 3d he was attacked by Gen. W. E. Jones' cavalry brigade and, after a spirited resistance, continuing nearly the entire day, in which he lost 10 killed and over 40 wounded, was finally surrounded and obliged to surrender. The Confederates reported that he surrendered 383 officers and men, 45 of whom were wounded, 3 pieces of artillery, and 27 wagons. The Confederate loss was about 30 killed and wounded. Consult "Official Records," Vol. XXXII.

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Jonquil, jōn'kwil. See NARCISSUS.

Jon'son, Ben or **Benjamin**, English dramatic poet, the contemporary and friend of Shakespeare: b. Westminster 1573; d. London 6 Aug. 1637. He was the posthumous son of a clergyman, and was placed at the Westminster grammar-school, where he laid the foundation of his learning, but was ultimately withdrawn, it is said, by his stepfather, a master bricklayer, who wanted his assistance in the business. He soon tired of this occupation, entered the army as a private soldier, and showed much personal courage during a campaign in Holland. Returning to England he began his career as an actor, and in 1598 his drama, "Every Man in his Humour," was performed at the Globe, with Shakespeare in the cast. About this time Jonson killed an actor, Spenser by name, in a duel, was branded on the left thumb, and deprived of his personal effects. In 1599 he brought out his comedy of "Every Man out of his Humor," followed by "Cynthia's Revels" (1600); the "Poetaster" (1601); "Sejanus," a tragedy (1603); "Volpone" (1605); "Epicene, or the Silent Woman" (1609), the best of his comedies; "The

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Alchemist' (1610); and 'Bartholomew Fair' (1614). The festivities which welcomed the new king, James I., gave a new impulse to the representation of masques, in the composition of which the ready talent of Jonson was employed by the court itself, the celebrated Inigo Jones doing the decorations. In 1604 he had some share with Chapman and Marston in writing 'Eastward Ho,' certain passages of which, reflecting satirically on the Scottish nation, drew down the anger of the king. Chapman and Marston were imprisoned, and Jonson voluntarily served the sentence with them. In 1613 Jonson made a tour in France as governor of Sir Walter Raleigh's eldest son. In 1618 he visited Scotland, staying for some time with Drummond of Hawthornden, whose notes of his guest's conversation are amongst the best accounts we have of Jonson's personality. In 1619 he returned to England, and on the death of the poet laureate was appointed his successor, and the salary raised to the sum of £100 by Charles I. Much of his time was spent at the Apollo, Mermaid, and other taverns, engaging in those brilliant contests of wit in which in earlier days Shakespeare also took part. His latter days were spent in fame and honor, as the acknowledged chief of English literature, and he enjoyed a pension of £200 from the crown. He died leaving behind him an unfinished pastoral drama of great beauty, 'The Sad Shepherd.' He was buried in Westminster Abbey, where a monument was erected to his memory with the inscription, 'O rare Ben Jonson.' Jonson's best dramas are based on the method of ancient comedy, are excellent in plot and development, and have strongly conceived characters and excellent traits of humor. He is sometimes forced and unnatural, and deals perhaps too much with passing manners and eccentricities. He had a genuine lyrical power, seen in his short poems and the songs such as 'Still to be neat, still to be drest,' interspersed in his masques. Jonson was also considered one of the leading scholars of his time, and his own dramatic works evince profound knowledge of the classical literatures. There is a collective edition by Gifford (9 vols. 1716; 2d ed. 1875). Consult the 'Life' by Symonds (1883); Swinburne, 'Study of Jonson' (1889); Fleay, 'English Drama' (1891); Koepel, 'Quellen-Studien zu den Dramen Ben Jonsons' (1895).

Joplin, Mo., city, one of the county-seats of Jasper County; on the Kansas C. S., the Missouri, K. & T., the Missouri P., and the St. L. & S. F. R.R.'s; about 68 miles west by south of Springfield and 138 miles south of Kansas City. Joplin is situated in an agricultural region, and also in the midst of the zinc and lead fields in the southwestern part of the State. The place was first settled about 1870 and incorporated three years later. The chief industrial establishments are foundries, machine-shops, smelting-works, paint-works, flour-mills, white-lead works, and lumber-mills. Some of the prominent public buildings are a Carnegie library, established in 1903, a Federal government building, a courthouse, an opera house, and the Y. M. C. A. building. The value of the output of zinc and lead in the Joplin district for the year 1902 was about \$10,000,000. The government, except that of the schools, is vested in a mayor, who holds office two years, and a city council. The Board

of Education consists of six members, two of which are elected each year on an independent and separate ticket. The city owns and operates the light plant. Joplin has grown rapidly and has made many public improvements. Pop. (1890) 9,943; (1900) 26,023.

Jop'pa. See JAFFA.

Jo'ram, or Jehoram, name of two Hebrew kings, one of Israel (851-842 B.C.) and the other of Judah (848-844 B.C.). (1) JEHORAM king of Israel was the second son of Ahab, and succeeded his brother Ahaziah. He revived the worship of Jehovah, and repressed the worship of Baal. He joined with the king of Judah in a war with the Moabites. In his reign Benhadad king of Damascus invaded Israel, and besieged Samaria, but retreated to meet a hostile invasion in his own country. In a battle with Hazan king of Syria Jehoram was wounded and retired to Jezreel, where he was slain by Jehu whom Elisha had anointed king over Israel.

(2) JORAM king of Judah was the son and successor of Jehosaphat and for four years from 848 B.C. had a luckless reign. The Edomites revolted in the land and Libna joined them, while Bedouin tribes of Arabia sacked Jerusalem and carried off the wives and son of the king, who died horribly of an intestinal disease, as had been foretold by the prophet Elisha.

Jordaens, Jacob, yä'kōb yör'däns, Flemish painter: b. Antwerp 19 May 1593; d. there 18 Oct. 1679. From his early boyhood in 1607 he was the pupil of Van Noort, whose daughter he afterward married, and in 1615 was made master in the Guild of St. Luke at Antwerp. He was the most eminent painter of the Flemish school next to Rubens, upon whose death he was acknowledged to be the first painter in Flanders. While as a colorist and draftsman he was much indebted to the influence of Rubens, it must be admitted that he embodies the characteristics of the Flemish school in a much more real and wider sense than that master does. This is due to his love of humor which is not a characteristic of Rubens. Nor does he show the influence of the Italian style, which gave such unique splendor to the creations of Rubens. While he painted religious pictures his strength lies in his humorous delineations of popular life. These spirited, genial and lifelike genres are found in all the principal galleries of Europe. The most renowned among his religious pictures are 'The Last Supper' in the Antwerp Museum; and 'The Martyrdom of St. Apollonia' in the church of the Augustines, Antwerp. He painted also a great many mythological subjects, bacchanalians, satyrs, Dianas and nymphs; and executed two allegorical pictures in the royal summer palace "Huis ten Bosch" (Castle in the Wood) near The Hague, the subjects being 'Death Triumphant over Envy' and 'The Triumph of Henry of Orange over his Enemies of all Sorts.'

Jordan, jör'dan, Conrad N., American financier: b. New York 20 April 1830; d. there 26 Feb. 1903. He entered a printing office, but soon exchanged this for a banking establishment, was cashier of a New York bank in 1864-80, and in 1880-4 was treasurer of the New York, Ontario and Western railroad. In 1885-7 he was treasurer of the United States, and introduced in the accounts of the treasury a revised

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form of debt and cash statements. He was an organizer of the Western National Bank of New York and for a time its president. In 1893 at the recommendation of all important New York banks, he was appointed assistant United States treasurer in New York, and this post he held until his death.

Jordan, David Starr, American college president and naturalist: b. Gainesville, N. Y., 19 Jan. 1851. He was graduated from Cornell University in 1872 and was instructor in botany there 1871–2. He was professor of natural history at Lombard University, Ill., 1872–3, and taught the same subject in the Indianapolis High School, 1874–5. From 1875 to 1879 he was professor of biology at Butler University, Indianapolis; professor of zoology at Indiana University 1879–85, and president of the last named institution, 1885–91. Since 1891 he has been president of Leland Stanford Junior University. Beside innumerable scientific monographs and reports, among which may be named 'Synopsis of the Fishes of North America' with C. H. Gilbert (1882); enlarged in 1896 with title 'Check List of the Fishes and Fish-Like Vertebrae of North and Middle America'; and 'Report of Far Sea Investigations'; he has published 'Science Sketches' (1896); 'Footnotes to Evolution' (1898); 'Imperial Democracy' (1899); etc. He was president of the California Academy of Sciences 1896–8 and 1901–3, and has been commissioner in charge of the United States Fish Commission investigations in the Pacific Ocean from 1901, and of the salmon investigations for Alaska from 1903.

Jordan, Elizabeth Garver, American journalist: b. Milwaukee, Wis., 9 May 1867. She is editor of 'Harper's Bazaar' and has published 'Tales of the City Room' (1898).

Jordan, Jules, American composer: b. Willimantic, Conn., 10 Nov. 1850. He is the author of several cantatas, including 'Barbara Frietchie' and 'Wind Swept Wheat'; and many sacred and secular songs.

Jordan, Thomas, American soldier: b. Luray, Va., 30 Sept. 1819; d. New York 27 Nov. 1895. He was graduated from West Point in 1840; and distinguishing himself in the Mexican War, was promoted captain in March 1847. He was stationed on the Pacific coast in 1856–60, during which time he introduced steam navigation above the Dalles, on the Columbia River. He served in the Confederate army during the Civil War and was promoted brigadier-general for gallantry at the battle of Shiloh. In 1869 he went to Cuba, where he was made chief of the general staff of the insurgent army and soon afterward commander-in-chief of the revolutionists, winning a battle at Guarimar, in January 1870. In the following year he resigned and settled in New York, where he became editor of 'The Financial and Mining Record.' He published 'Campaigns of Lieutenant-General Forrest' (with J. B. Pryor, 1868).

Jordan, William George, American journalist: b. New York 6 March 1864. He was graduated at the College of the City of New York; and became managing editor of the 'Ladies' Home Journal' in 1897, and was editor of 'The Saturday Evening Post' in 1898–9. He has published 'Mental Training by Analysis, Law and Analogy'; 'Mental Training a Remedy for

Education'; 'The Kingship of Self Control'; and 'The Majesty of Calmness.'

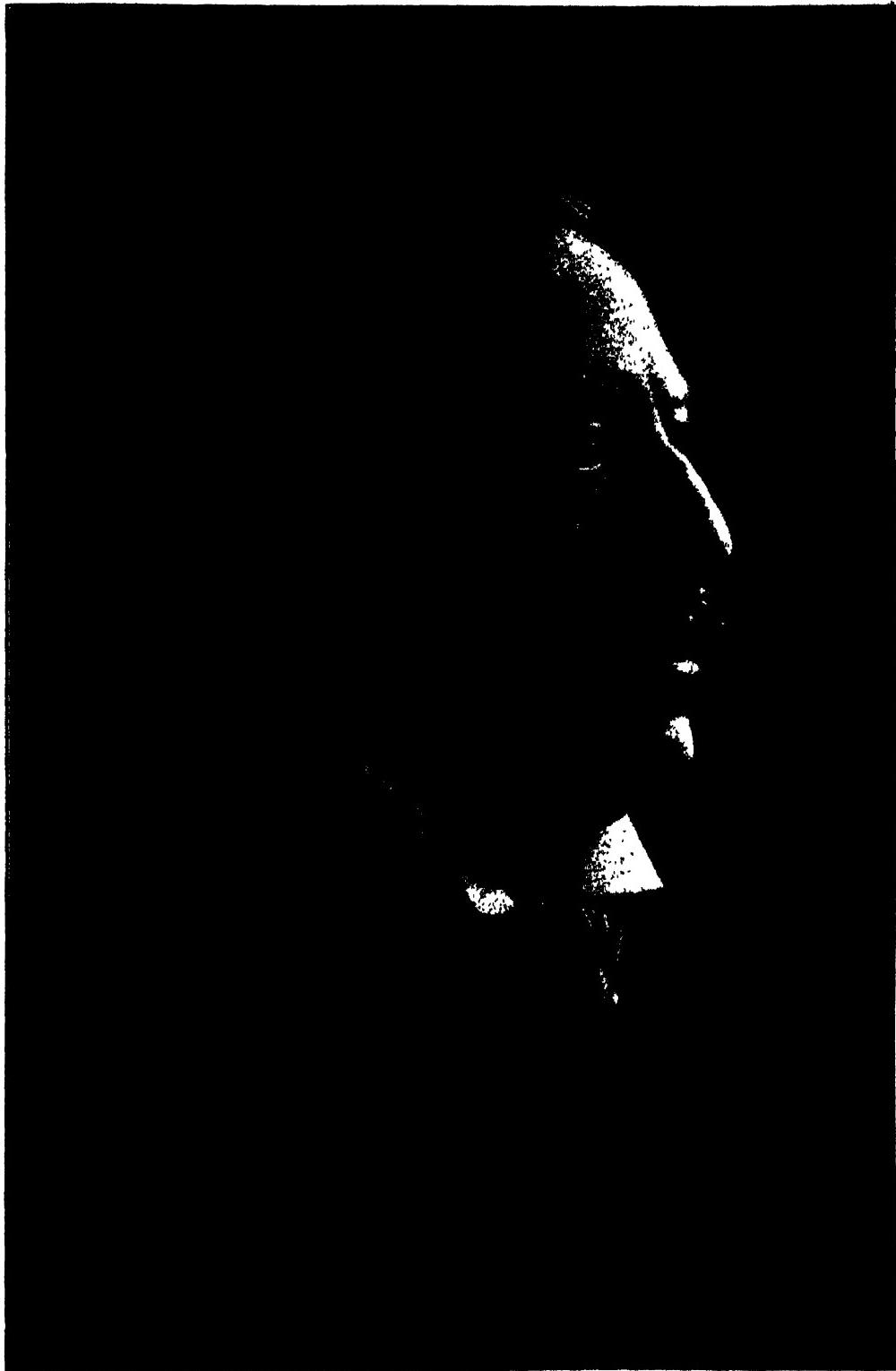
Jordan, the largest river of Palestine, and one of the most celebrated in the world. It rises from three main sources at the foot of Hermon, and these upper streams unite in Lake Huleh, the ancient Waters of Merom. From this point it sinks with a rapid current in a narrow rocky bed below the level of the sea, and falls after a course of 9 miles into the Lake of Galilee. Shortly after leaving the south end of this lake it enters a broad valley called by the Arabs Ghôr, and in the Bible "the plain"; and continuing a singularly crooked course of about 65 miles direct distance, or 200 including windings, falls into the north end of the Dead Sea, having received the Zerka or Jabbok and numerous smaller affluents. The Ghôr expands at Bethlehem and Jericho into a wide plain, but elsewhere is from three to five miles across. The upper part of the valley of the Jordan is hilly, arid, and barren, but it becomes more level and fertile as it approaches the Zerka. The river is muddy and full of small fish. In the dry season it is shallow, with an average width of from 30 to 50 yards. At its mouth it is about 180 yards broad and about 3 feet deep. It is subject to great inundations during the winter season. The valley of the Jordan forms one of the most remarkable depressions in the world, the Dead Sea being 1,312 feet below sea-level, and the total fall of the river being about 2,300 feet.

Consult: 'Official Report' (Washington, 1852); 'Survey of Western Palestine' (London, 1859); Smith, 'Historical Geography of the Holy Land'; Molyneux (in the 'Journal' of the Royal Geographic Society 1848); Lynch, 'Narrative of the United States Expedition to the River Jordan and the Dead Sea' (1849); McGregor, 'Rob Roy on the Jordan' (1870); Costello, 'Gospel Story'; Macmillan, 'Guide to Palestine and Egypt'; Thomas, 'Two Years in Palestine.'

Jorullo, hö-rool'yō, a volcano of Mexico in the State of Michoacan, 160 miles southwest of Mexico, and 80 miles from the Pacific. The district had continued undisturbed from the discovery of the New World when, in June 1750, earthquakes occurred, followed 29 September by one more violent. On the line of a chasm which was made, six volcanic cones were formed, the loftiest, Jorullo, 1,600 feet above the plain. The total height of the volcano above the sea is 4,265 feet. It shows but few signs of activity at present.

Joseffy, yō-séf'i, Rafael, Hungarian-American pianist. b. Miskolcz, Hungary, 1853. He was a pupil of Moscheles at the Leipsic Conservatory and of Tausig at Berlin, won distinction in a concert tour of Holland and Germany, and later appeared with large success throughout Europe and the United States. For several years he was a professor in the National Conservatory at New York, where he resided from about 1880. As a virtuoso he evinces great facility and technical finish, and won particular recognition through his interpretations of Chopin. His compositions include: 'Ungarisches Album' (6 works for pianoforte); 'Die Mühle' (op. 23); a 'Marche Turque'; and 'Conzert-Studien nach Chopin.'

Joseph, Saint, the husband of Mary the mother of Jesus Christ, was a descendant of the



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house of David, born at Bethlehem, but resident at Nazareth, where he practised the trade of a carpenter. Tradition and art represent him as an old man at the time of Christ's birth and he is said to have died before the beginning of Christ's public ministry. His day in the Roman Catholic calendar is 19 March.

Joseph, a son of the patriarch Jacob by his favorite wife Rachel. His father's preference for him and his own relation of dreams which predicted his future exaltation above those of his household drew upon him the envy of his brothers, who sold him to Ishmaelites and Midianite slave-dealers, by whom he was sold to Potiphar, a captain of the guard in Egypt. The story of his condemnation to prison on the false accusation of Potiphar's wife, of his release and subsequent elevation to the position of vice-regent of Egypt and the final settlement there of his father and brothers is related in the Book of Genesis. Authorities still differ as to the period in Egyptian history to which Joseph's life belongs, but the majority agree in placing it under the Hyksos or shepherd kings.

Joseph of Arimathea, member of the Jewish Sanhedrin, who believed in Jesus, but had not the courage to make profession of faith. He was born in Rathaim, a city of Benjamin, near Lydda. After the crucifixion he went to Pilate, begged the body of Jesus, wound it in fine linen and buried it in his own new tomb. According to tradition he came as apostle to Glastonbury, England. His day is 17 March in the Roman Catholic calendar, and 31 July in the Greek Church.

Joseph I., emperor of Germany: b. Vienna 26 July 1678; d. 17 April 1711. He succeeded his father, Leopold I., and was employed for nearly the whole of his reign in war. With England and Holland he continued the war against France, to seat the Archduke Charles on the throne of Spain. The great victories gained by the allies under Marlborough in the Low Countries, and Prince Eugene on the Rhine, made the reign of Joseph especially noteworthy. He was equally triumphant in Italy and Hungary; in the latter kingdom driving the revolted Bagotski from the country, and forcing him to seek safety in Turkey; while in the Italian peninsula, great cities from Mantua to Genoa were laid under heavy contributions.

Joseph II., German emperor, son of Francis I. and Maria Theresa: b. Vienna 13 March 1741; d. there 20 Feb. 1790. He was elected king of the Romans in 1764, and on the death of his father, 1765, German emperor. His mother declared him co-regent in the hereditary states of the house of Austria, and gave him the command of the army; but the real authority remained in her hands. In the earlier part of his reign he employed his time in traveling and becoming acquainted with his states. In 1780 Joseph came into the possession of full dominion over his hereditary states. He allowed a greater freedom of the press, put an end to the connection between Rome and the religious orders, diminished the pensions, placed the Jews on a better footing, abolished bondage, suppressed all nunneries, and many monasteries, particularly those of the purely contemplative orders. All branches of the government, public education, the police, and the peasantry, were reformed. By a

new code of laws capital punishments were abolished. On 9 Feb. 1788 he declared war against the Turks. By the defeat at Lugas (20 Sept. 1788) the army was obliged to retreat, but in the following year fortune favored the Austrian arms, and Belgrade surrendered. With the tax law, introduced in November 1789, nobility and peasantry showed themselves equally dissatisfied, and the signal was given for open rebellion. The Netherlands declared themselves independent, and expelled the imperial forces from all the provinces, and Luxemburg alone remained in the possession of the imperial troops. The Hungarians also rebelled, and demanded the restoration of their ancient rights and constitution. Joseph, in January, 1790, declared all the acts of his government in that country revoked, even to the edict of toleration (22 June, 1781). Joseph was a man of considerable ability, but arbitrary and despotic. Whatever his own reflections or his knowledge of other countries showed to be useful, he wished to introduce. But he did not sufficiently consider that he had to do with men who would not see things in the same light as himself; and that long habit rendered it difficult to change, at once, usages sanctified by time. Being a freethinker he often grossly overrode the rights of the Church. Consult Gross-Hoffinger, 'Lebens- und Regierungs-Geschichte Josephs II.' (1835-7); Brunner, 'Joseph II.' (1885); Schlitter, 'Pius VI. und Joseph II.' (1894).

Josephine (Fr. zhō-zé-fēn), empress of the French: b. Trois Islets, Martinique, 24 June 1763; d. Malmaison, near Paris, 29 May 1814. She was the daughter of Lieutenant Tascher de la Pagerie, and was married in 1779 to Vicomte Alexandre Beauharnais, by whom she had two children, Eugène and Hortense. In 1794 her husband, who had been commander of the army of the Rhine, was executed by order of the Convention. She herself had a narrow escape, having been included in the list of proscription. After the fall of Robespierre she paid a visit to Napoleon to thank him for restoring the sword of her husband, and so pleased him that he soon after married her (1796). When Napoleon became emperor in 1804 she was crowned with him. But the fact that the union was childless stood in the way of Napoleon's ambition to become the founder of a dynasty, and accordingly in 1809 Josephine was divorced, retiring to her seat of Malmaison, with the title of empress-queen-dowager and an annual grant of two million francs. Consult: Aubenay, 'Histoire de l'Impératrice Josephine' (1859); Welschinger, 'Le Divorce de Napoléon I.' (1889); Ober, 'Josephine, Empress of the French' (1901).

Josephus, jō-sē'fus, **Flavius** (Jewish name, JOSEPH BEN MATTHIAS), Jewish historian: b. Jerusalem 37 A.D.; d. about 95 A.D. He was carefully educated and in 64 A.D. he made a journey to Rome. On his return he found his countrymen preparing to throw off the Roman yoke, and having tried in vain to persuade them of the hopelessness of such a struggle, accepted the post of defending the province of Galilee, and actually held the fortified town of Jotapata against the whole Roman army for 47 days. He was captured at the fall of the city, was afterward present in the Roman army at the destruction of Jerusalem (70 A.D.), and went with Titus to Rome, where, assuming the family name

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his patron, Flavius, he lived in learned leisure. Here he wrote (in Greek) 'The History of the Jewish War' and 'The Antiquities of the Jews,' being a history of the Jews from the earliest times to the reign of Nero.

Josh Billings. See SHAW, HENRY WHEELER.
Joshua, the leader of the Israelites after the death of Moses. He was the son of Nun, of the tribe of Ephraim, and upon him fell the task of conducting the people over the Jordan, and commanding their armies in battle against the heathen they were ordained to dispossess. He succeeded in ravaging a large portion of Palestine, and dividing it among the people. He died at the age of 110 and was buried at Timnath-Serah, in Mount Ephraim.

Joshua, Book of, a historical book of the Old Testament, sometimes classified as the last division of a Hexateuch, and containing an account of Joshua's leadership in Israel from the death of Moses until his own death. While it has many resemblances in style and arrangement to the Pentateuch, or first five books of Moses, it must have been early separated from them, if ever it was included in the same series, for the Samaritans, though they have had the Pentateuch since the 8th century before Christ, have never acknowledged the Book of Joshua. The contents of the book may be divided into three parts: the conquest of Canaan; the partition of the land among the 12 tribes; and the parting address made by Joshua to the assembled people. The first part is a narrative of the manner in which Joshua prepared to cross the Jordan at the head of the Israelites. The miraculous passage of the Jordan is accomplished, circumcision is performed, and the Passover observed on the soil of the Promised Land. Jericho and Ai are captured; the covenant confirmed at Ebal and Gerizim; the Gibeonites secure a treaty of peace through guile. The decisive battle of Bethhoron ends in the rout of the leagued kings. The second part is topographical and statistical, gives a general view of the land, with some account of its apportionment, and the setting aside of the Cities of Refuge. The third and concluding section is in the style of Deuteronomy. The people are exhorted to remain faithful to Jehovah, to eschew idolatry, and at Shechem, to which place the bones of Joseph had been brought, the covenant is renewed. The death and burial of Joshua and Eleazar make up a narrative which closes the book.

Josiah, king of Judah. He succeeded his father Amon (638 B.C.). He is said in the Scriptures to have done "that which was right in the sight of the Lord." He took an active part in the reform of temple worship, and in the abolition of idolatry throughout the land, and commenced the restoration of the temple, during the progress of which the high-priest Hilkiah discovered the book of the law, that is, the book of Deuteronomy. In his 30th year he marched out against Pharaoh Necho, king of Egypt, who was on his way to attack the kingdom of Assyria. Josiah was slain in the battle at Megiddo where he had attempted to check the northward march of the Egyptians.

Josiah Allen's Wife. See HOLLEY, MARIETTA.

Joss, the penates of the Chinese; every

family has its joss. A temple is called a joss house. The joss is an idol, usually of wood and decorated in colors, mostly in gold and red. There are three large joss houses in San Francisco, one in Chicago and two in New York. A Chinese upon entering the presence of a joss falls upon his knees, and touches his forehead thrice upon the floor, as a preliminary of worshipping the joss. See CHINESE; IDOLATRY; IMAGE WORSHIP.

Jo'tham, king of Israel and Judah, who succeeded (735 B.C.) Uzziah, his father. He ascended the throne at the age of 25 and reigned 16 years.

Joubert, yow'bërt, Petrus Jacobus, Boer military officer: b. Cape Colony 1831; d. Pretoria 27 March 1900. After an elementary education he settled as a farmer in the Wakkerstroom district of the Transvaal, about 1863 was elected for that district to the Volksraad, and in 1870 became attorney-general of the South African Republic. During the visit of President Burgers to Europe in 1874 he was acting president. In 1880 he became commander-in-chief of the Boer forces at the outbreak of the war with England, and three times defeated the British, at Laing's Nek, Ingogo, and Majuba Hill, the last battle (27 Feb. 1881) deciding the war in favor of the Boers. He was again acting president during the absence of President Kruger in Europe in 1883-4. He twice unsuccessfully contested the presidency with Kruger, the vote being 7,881 to 7,000 in 1893 and 12,858 to 2,001 in 1898. In the second Boer war also he was commandant-general, and directed the campaign in northern Natal which resulted in a succession of disasters for the British. He became ill early in 1900, however, and was obliged to withdraw from active service. He was the ablest of the Boer military leaders.

Jouett, jow'ët, James Edward, American naval officer: b. Lexington, Ky., 27 Feb 1828; d. Sandy Spring, Md., 1 Oct. 1902. He entered the navy in 1841, served during the Mexican War, was graduated from the United States Naval Academy in 1847, in 1861 with a detachment of marines entered Galveston harbor and destroyed the Confederate war-vessel Royal Yacht, and for his services was appointed to the command of the United States steamship Montgomery. As lieutenant-commander, he was prominent in Farragut's entrance of Mobile Bay (August 1864), and in 1885, when in command of the North Atlantic squadron he opened the transit across the Isthmus of Panama, closed by the rebels. He was promoted rear-admiral in 1886, subsequently president of the Board of Inspection and Survey, and in 1890 was retired.

Jouffroy d'Abbans, Claude François Dorothee, klöd frān-swä dō-ro-tä zhoo-frwa dāb-bāñ, MARQUIS DE, French inventor: b. Franche-Comte 30 Sept. 1751; d. Paris 1832. He is claimed by the French as the inventor of steam navigation. He served in the army, and in 1783 succeeded in propelling a small paddle-wheel steamboat up the Rhone at Lyons—the connection between piston and paddle-wheel axle being rack-and-pinion.

Joule, James Prescott, English physicist: b. Salford, Lancashire, 24 Dec. 1818; d. Sale, Cheshire, 11 Oct. 1889. He was chiefly his own educator, but received special instruction in

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physics from John Dalton (q.v.). While associated in business with his father, a brewer, he early developed an enthusiasm for original scientific research, and described in the 'Annals of Electricity' (January 1838) an electromagnetic engine he had invented. While it was afterward found that this invention was impracticable as a substitute for the steam-engine, the further investigation to which it led brought to light many important facts concerning the laws of heat, its electrical and mechanical nature and evolution, chemical affinity as related to heat, etc. The mechanical equivalent of heat (see HEAT) was first ascertained by Joule, who also, in 1847, announced the doctrine of the correlation and conservation of energy, in a paper read at Manchester which failed at the time to impress men of science, as did also an address of like import before the British Association, but which was taken up by William Thomson (Lord Kelvin), by whom its momentous significance was brought home to the scientific world. No principle of science is now more fully established than Joule's law for determining the energy developed by an electric current in overcoming the resistance of a circuit, a law which he verified by experiment. He received the highest honors of scientific bodies and universities, and in 1873 was made president of the British Association for the Advancement of Science. His writings are to be found mainly in the proceedings of scientific societies and in English periodicals, but in 1885 and 1887 appeared, in two volumes, his 'Scientific Papers.'

Journalism. Journalism is a comprehensive term which signifies the business of producing a public journal. In a general way it is applied to the vocation of making newspapers. Broadly speaking it is both a business and a profession, though the name of journalist as commonly understood is limited to those who are engaged on the editorial or news or literary side of the production rather than on the business side. While editor and journalist are not strictly synonymous—the former meaning the head of a paper or a department and the latter any literary worker on a newspaper—they are often used as convertible terms.

In a large sense the subject involves the functions of journalism as collector and purveyor of news and as leader and exponent of public opinion; the ethics of journalism in its various fields of political, religious, literary, social and commercial aim and representation; the relations of the counting room to the editorial department; the training and qualifications of the journalist; in short, the mission, methods, responsibilities and obligations of journalism. All of these general phases are deeply affected by the physical conditions of the business. Within the last twenty-five years these conditions have been practically revolutionized. In the mechanical facilities of production, in the cheapening of white paper and in the instrumentalities of news collection there has been an extraordinary advance. This great change in the material factors has wrought a corresponding change in the scope and character of journalism. Not only as a business enterprise but as a public influence it takes on new aspects.

The remarkable development of later years touches every side of the material production of

a newspaper. The old, limited, slow-moving printing press has been transformed into the ingenious and gigantic quadruple or octuple which converts the plain white roll into complete, folded papers, at the rate of thirty to forty thousand an hour. The number of pages may be determined at will, even at the last moment before going to press, thus responding to the exigencies of the news; and the application of the half tone and of color at undiminished speed permits pictorial effects. Simultaneously with this improvement in the printing press has come the linotype which substitutes machine type setting for hand composition. A third vital advance has been the perfection of the process of making paper out of wood-pulp which has vastly increased the supply and greatly decreased the cost of white paper.

These radical changes in the elemental business factors have largely modified the conditions of journalism. They have opened the way to unlimited production and have enormously cheapened the cost of the single copy. Penny and two-cent papers have become the prevailing rule. Immense circulations have thus been rendered possible, and where twenty-five years ago the edition even of the most widely read papers was comparatively limited, not a few now issue scores and even hundreds of thousands of copies a day. At the same time the initial cost of the newspaper plant with its expensive machinery and the magnitude of the daily transactions require a far larger outlay than in the earlier time and the business has come to be one demanding much greater capital.

All of these circumstances have inevitably and powerfully moulded the course and character of journalism. They have given increased importance to its business side, and have tended to make business considerations in the publication still more dominant. The effect has been two-fold and somewhat contradictory. The great capabilities of the business with the reduced cost of telegraphing have stimulated and quickened journalistic enterprise and have broadened the range of the journalistic field. The scope of journalism has been enlarged and in many cases its standard has been elevated. Within a sphere, perhaps too limited, the best and worthiest effort is accepted as the best business. But, on the other hand, the competition for great circulations has bred sensationalism and a pandering to the taste for personal and piquant matters. There is an eager and feverish struggle for the unusual, the dramatic and the spectacular, a constant straining for effect, a lavishness of "scareheads" and garish pictures, a studied and persistent search for objects of criticism and attack. The appetite for the effervescent grows by what it feeds on, and must be met by new excitation. This rivalry of explosive and paroxysmal journalism is carried on with too little sense of responsibility and verification, and while the notable manifestations are exceptional, and it would not be just to say that the infection has extended through journalism, it is nevertheless true that its injurious influence is widely perceptible.

In one important and conspicuous respect the development of journalism as a business has palpably improved its character. It has produced a greater degree of independence than

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ever distinguished it before. In the earlier days political and official advertising might be a large item in the income of a newspaper. Its monetary value gave it potency in controlling editorial policy. But in the expansion of the business under modern conditions official patronage is unimportant compared with general commercial advertising, and its relative decline in value has greatly reduced its power of influencing newspaper expression. The favor of the public is far more advantageous than that of the party manager. It brings popular circulation and consequently business advertising, and there is less concern about the crumbs that fall from the official table. Even party journalism has greatly advanced in independence. While standing as the recognized exponents of party principles and policies the important party papers have become much more free in their judgment of men, methods and measures. A more critical standard is applied and a more rigorous public accountability is enforced under which there has been a visible improvement in general civic administration.

Under the same influences distinctive independent journalism has increased. It professes to have no connection with any party and disclaims a representative party position. Its theory is that it addresses itself not to party sentiment but to independent public judgment, and its claim for support is based on its journalistic quality without regard to political association. It is the extraordinary advance of newspaper-making as a business that has rendered independent journalism on a large scale possible. A quarter of a century ago it would have been difficult to name more than two or three important examples in the United States. Now there are many conspicuous and successful papers which are thus classed, and even more significant of the change in journalism is the greater independence of the party journals already referred to. Indeed, in essential independence, which consists of free judgment and candid expression on public questions, the line of demarcation between the better class of party papers and the professedly independent papers is scarcely perceptible and it would be hard to distinguish between them.

There has been a signal advance in other directions. Against the false and meretricious tendencies to sensationalism which have been indicated must be placed a higher and broader treatment of all the varied interests of life. In news collection the journalism of to-day is as much ahead of that of 25 years ago as the railroad express is ahead of the stage coach. It spares no expense, reaches everywhere, sends its correspondents to all parts of the world, employs the best experts and specialists, caters equally to the lover of literature and the lover of sports, keeps pace with scientific discovery and development, rivals the best periodicals in commanding the most famous writers and artists, makes its own special missions of public service, reports all business, social, educational, philanthropic and religious movements, and, in short, treats whatever concerns mankind as within its boundless domain. Its range, enterprise and comprehensiveness are a constant marvel. With all its faults the breadth, fullness and accuracy which are combined with so much celerity of action attest a thoroughness of organ-

ization and extent of resources never before equalled.

There are marked differences, however, in its development in different lands. Continental journalism in Europe is of a type quite distinct from English journalism, and that again is unlike American. In Paris the news is not the conspicuous feature of the newspapers. It holds a subordinate place and is limited in its quantity. Literary and dramatic criticism and political discussion command the first rank, and the feuilleton is a popular and important part. Literary excellence with a flavor of characteristic French wit is the dominant trait. The Parisian type with variations, generally soberer and heavier, is the prevailing continental model. English journalism is weightier and more enterprising in news. It covers the field of international politics and war with special thoroughness. It lacks the variety and vivacity of American newspapers, but within its chosen and more limited range it is more complete. Its reports of parliamentary proceedings and of important political, social and scientific meetings are copious and intelligent, and its discussions are distinguished by sobriety and information.

In life, spirit, minuteness of news gleaning, emphasis of display, and preponderance of personal flavor American journalism far outstrips all others. It does not surpass, oftentimes does not equal, British journalism in the presentation of great events, but in the multiplicity of its news of all sorts not only from its own country, but from all the world, there is no approach to it elsewhere. Its dominant tone is a light and airy freedom. There is a manifest tendency even on the part of the most respectable newspapers to avoid being heavy. The general aim is to be breezy, pungent and picturesque, and this often leads to the flippancy which is remarked in American papers. Perhaps the public taste which is thus indicated and cultivated will serve to explain in part why there are no serious and masterful weekly journals of literary and political discussion in the United States like the 'Spectator' and the 'Saturday Review,' and why even the monthly periodicals run chiefly to fiction and light matter. There are excellent trade journals of a high grade, showing a demand for the searching and careful treatment of special interests, but outside of these immediate representatives of the stupendous material enterprises of the land, the trend is towards the lighter vein.

Somewhat analogous is the explanation of the fact that journalism has grown more impersonal in its sources and impress. It is no longer distinguished by the great overshadowing personalities which marked it a generation ago. No editorial chief puts his individual stamp on a paper as Horace Greeley did, with his controversial power, his moral earnestness and his incisive force, which seemed to make the whole paper breathe his spirit and speak his voice. There are no successors to Raymond, Bennett, Weed, Bowles, and Dana. Henry Watterson is perhaps the only survivor of the old school of journalists. The difference is due, however, not so much to the lack of men as to the change of conditions. In its immeasurably wider range and larger demands the great journal of to-day is the product of no single mind, but of a vast organization and of a whole galaxy of stars. The elder journalism was largely political

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pamphleteering. The later journalism is the complete mirror of daily life, and no individual throws so great a shadow across its comprehensive face.

It is a question much mooted whether journalism has declined in influence. It never was as universally read as now; it never was so much a common practice to read several newspapers; and whether in this multiplicity of reading and frequent contrariety of representation as serious an impression is made as when the appeal was more earnest and less divided may well be doubted. The editorial page has not actually fallen off in interest and importance; on the contrary, it is all in all better written, more varied and more instructive than when it had more of a polemic character. But in the broad development and great advance of the news departments the editorial page has receded in relative importance, and the drift to the light treatment of topics has tended to detract from its distinct and superior position. The greater absorption of the public mind in multiplied interests operates in the same direction. In the stress of modern business life and in the variety of diversions the body of readers have less time to follow public discussion. If it be true, as it often is, that the favorite journal does the thinking for its readers on current questions, it is equally true that many of the questions take less hold than when life was more simple and feeling more tense. When the press is in substantial accord on any public matter, except where party tradition rules, it generally carries the public judgment, and united expression makes it invincible; but when there is a discord of journalistic voices little heed is apt to be paid to any. The power of the press in its aggregate force, in the sweep of its activities and in a certain apprehension of its publicity, has steadily augmented, but at the same time the impression that it is too intrusive, too little restrained, too little governed by a just sense of responsibility, has grown and has impaired the influence it would otherwise exert.

It remains true, however, and probably grows more true with the decadence of other influences, that the press is the most effective force in protecting the moral and social well-being of the community. It is the belief of many observers that under our modern conditions the weight of mere authority is declining. In the intense strife and eagerness of the times the efficacy of the old standards in enforcing true principles and restraining wrongdoing grows weaker. With this advance of individual assertion and independence the power of public opinion is becoming the surest defence of social and business morality. The blaze of publicity gives a protection which nothing else furnishes. In the financial and social world there is a wide margin along the shadowy and undefined line between law and lawlessness, between ethical duty and questionable interest, where the search-light of exposure is the only security. Much would be done under cover of darkness which fears the light. Despite a freedom which often degenerates into license the press is thus recognized not only as the most effective safeguard against political and administrative debauchery but as the best bulwark against that social and business misconduct which becomes a public offence.

The relation of the counting-room to the

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editorial department involves both the business and the ethics of journalism. The business side cannot be disregarded. In its ultimate purpose it is a commercial proposition. Newspapers are published to make money. The counting-room considers both income and outgo. It adjusts expenditures to receipts. It properly studies to augment revenue in every legitimate way. But while newspapers are business enterprises they are such with recognized limitations and obligations. They are not simply business undertakings but public representatives, and the former object, while consistent with the latter, is subordinate to it. The foundation of the newspaper is the confidence of the public. It is the history of yesterday and the interpreter and teacher of to-day. In the very nature of the relation it assumes distinct obligations. It is bound to give the news and to treat public questions in absolute good faith. The counting-room is warranted in doing business in every way compatible with the fulfillment of that duty, but in all legitimate journalism it is a fundamental rule that editorial opinion and news publication must be beyond the reach of any questionable influence. The editorial department must be entirely free from commercialism. Public confidence and moral power depend on full faith that editorial and news conduct is honest, fearless and upright. The publication of a newspaper, like any other enterprise, is founded on business principles; its sphere or field of operations, whether general, political, literary or other, is chosen; the relation of counting room and editorial room in organizing and maintaining it on a sound business basis is of the most intimate character; but when the general lines of the enterprise are determined, the independence and integrity of the editorial management and fidelity to its declared aim as a public representative within its chosen sphere are absolutely indispensable. This rule lies at the foundation of the whole ethical code of journalism.

The question of the training and qualifications of the journalist has assumed new interest and importance both through the general growth of the profession and through special movements for its advancement. Schools or chairs of journalism have been established in a few instances and in a limited way, and the munificent endowment by Mr. Pulitzer of a College of Journalism in Columbia University—the first large and distinct project of the kind—has presented the proposition in a practical and definite form. There are two systems of thought on the subject. The first holds that the best and most efficient school of journalism is the newspaper office. It believes that the true journalist is born, not made; that knack, aptitude, native talent, the sense of news and proportion lie at the foundation of success; and that the most useful training is that of actual experience. It does not dispute that broad education and culture are essential to the journalist, and recognizes that particular studies, like history, political economy, the fundamentals of law, social science, and kindred matters, may be followed with special advantage. But it urges that these may be gathered from the general college course, and that the college or university has no distinctive professional knowledge to teach journalists in the special sense that it has to teach lawyers or physicians. The technical-

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ties of the newspaper art—a suitable style, phonography, proof reading, the treatment of news and the like—are best acquired in practice, and the rest is the quickest and surest application of knowledge which is power, and of instinct or intuition which in dealing with public intelligence and currents is no less power, to the activities of the world.

The other system of opinion is represented in the scheme and scope of Mr. Pulitzer's College of Journalism. It is based on the theory that the journalist can be prepared for his vocation, like the lawyer, by a special course of study adapted to its requirements. Its aim and its tendency are to elevate and dignify the profession, and to establish a higher standard both of obligation and of performance. It seeks to teach not merely the technical necessities in newspaper-making but the true ideals of public service to which the newspaper should be dedicated, and the wide range of knowledge with which the journalist should be equipped. This includes style, ethics, law, literature, history, sociology, statistics, and particularly the principles and methods of journalism. It embraces an examination and comparison of existing newspapers by experts, an exposition of the functions of editor, correspondent and reporter, and the production of an experimental journal under the necessary limitations with its practical application of the instruction. In its main features this plan is an enlargement of the ordinary academic course directed to a particular end, and it is claimed that the establishment of such a college with liberal endowment would not only provide a large body of trained journalists but would set a standard for the profession.

On the whole, notwithstanding the faults of the "new journalism," the position of the press in the public estimate is increasing. One evidence of this truth is the more liberal character of libel legislation. In some States the greater license has prompted efforts at more restrictive measures, but the general trend of legislation has been toward reasonable liberality with just accountability. The prevailing movement has been to provide reparation for any wrong or injury that may be done, to assure just restitution for actual damages, but not to permit punitive damages or trammel the free expression of opinion. Journalism is advancing and is acquiring a higher position and recognition as a distinct profession. With the enlightened spirit of the age and with the marvellous agencies of instant and united expression the power of public opinion steadily grows, and the journalist is its medium and prophet. See AMERICAN Newspapers; PERIODICAL LITERATURE.

CHARLES EMORY SMITH,
Editor ('The Press,' Philadelphia

Journalism, School of, a college of journalism, endowed by a gift of \$2,000,000 by Joseph Pulitzer, editor and proprietor of the *New York World*, to Columbia University, New York, in 1903. With the advance of civilization and general culture and intelligence the demands upon the journalists of the present day are constantly becoming greater, and this college is the recognition of the importance and place of journalism as a profession, and a practical endeavor to equip those who adopt it, by a course of thorough instruction for its exacting and laborious duties. Mr. Pulitzer consid-

ers the creation and rendering effective of public opinion (see PUBLIC OPINION, POWER OF) a task of which the press alone is capable of successfully accomplishing. The College of Journalism will therefore be a means to an end—to raise the character and standing of journalism, to increase its power and prestige, and to attract to the profession men of the highest capacity and the loftiest ideals, who, because of special training, will advance the professional to a higher standard of thought and action. This school is the first institution of the kind in the world. See JOURNALISM.

Joveite, *jōv'īt*, is a nitro-substitution explosive used in blasting, and as charges for high-explosive shells, which was invented by J. E. Blomen, Washington, D. C. It consists of nitronaphthalenes 6 to 8 per cent, nitro-phenols, 16 to 30 per cent, and nitrate of soda 64 to 76 per cent. It is made by melting the nitro-naphthalenes in a steam-jacketed kettle, adding the nitro-phenols and continuing the heating until they are melted, and then stirring into this liquid mixture the solid nitrate of soda in a finely ground and perfectly dry condition until each of the solid particles of the nitrate is coated and impregnated with the liquid. On cooling, the particles of the nitrate are protected from deliquescence by the coating of scarcely soluble nitro-substitution compounds, while on explosion, the nitrate causes the reaction to be most complete. For blasting purposes this explosive is used in a granulated condition, but in loading armor-piercing projectiles it is poured into the shell while in the plastic condition and on cooling sets to a hard mass which completely fills the cavity except for a canal in the centre where the fuse is placed. For blasting purposes the explosive is fired by means of a mercuric fulminate detonator, but the charges in shells are fired by means of gunpowder fuses. In tests of the explosive by the United States navy, made at Indian Head, Md., in 1897, a 10-inch Carpenter armor-piercing shell containing 8.25 pounds of joveite, fired with a velocity of 1,860 foot-seconds at a Harveyized nickel-steel armor plate, 14.5 inches thick, passed completely through the plate and burst on the other side. See EXPLOSIVES.

Jovianus, *jō-vi-ā-nūs*, **Flavius Claudius**, Roman emperor: d. Dadastana, Bithynia, 17 Feb. 364 A.D. He was originally captain of the household troops of the emperor Julian, whom he accompanied in the disastrous campaign against the Persians in which Julian lost his life (363 A.D.). After Julian's death he was proclaimed emperor by the troops, but could only extricate his army by ceding to the Persian monarch the five provinces beyond the Tigris. He was succeeded by Valentinianus I.

Jovellanos, *hō-vēl-yā-nōs*, **Gaspar Melchior de**, Spanish statesman and writer: b. Gijon, Spain, 5 Jan. 1744; d. Vega, Spain, 27 Nov. 1811. He was educated at the universities of Oviedo, Avila, and Alcalá, became in 1770 a member of the Royal Academy, in 1778 chief justice of the criminal court at Madrid, and in 1780 a member of the council of state. Subsequently he was for a time minister of justice, but in 1801, through the agency of his enemy, Don Manuel Godoy (q.v.), was imprisoned at Majorca. Released at the French invasion (1808),

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he joined the patriots, and became a member of the supreme junta. His writings are various, including treatises on political economy, a dissertation on English architecture, a 'Memoir on Law Applied to Agriculture,' the tragedy 'El Pelayo,' and 'El Delincuente Honrado' ('The Honorable Delinquent'), a comedy.

Jowett, Benjamin, English scholar and educator: b. Camberwell, London, 1817; d. Oxford 1 Oct. 1893. He studied at Oxford, was ordained in 1842, and became regius professor of Greek in 1855. In 1855 he published a notable commentary on the Epistles of St. Paul. In 1860 he contributed an essay 'On the Interpretation of Scripture' to the celebrated volume 'Essays and Reviews,' for which he was tried on a charge of heresy before the chancellor's court, but was acquitted. In 1870 he became master of Balliol College, and in 1871 published his most important work, a translation of the 'Dialogues of Plato,' of which a fifth edition was issued in 1892. He subsequently published translations of Thucydides (1881) and the 'Politics' of Aristotle (1885). He was vice-chancellor of the university in 1882-6.

Joy, Charles Arad, American chemist: b. Ludlowville, N. Y., 1823. He was educated at Union College and the Harvard Law School, and after a few years spent as professor of chemistry at Union, became in 1857 professor of chemistry at Columbia, where he remained for 20 years. In 1866 he became president of the Lyceum of Natural History and was long one of the editorial staff of the 'Scientific American.'

Joy, George William, English painter: b. Dublin, Ireland, 1844. He was educated at Harrow, and studied art at Kensington, at the Royal Academy, and under Charles Jalabert and Bonnat, at Paris. He has won gold medals at Paris, Munich and Berlin. His principal pictures are 'Domenica'; 'Chess Players'; 'Laodamia'; 'Young Nelson's First Farewell'; 'Wellington at Angers'; 'Prince Charlie and Flora Macdonald'; 'The Death of General Gordon'; 'Princess Alice of Albany' (for Queen Victoria); 'Reverie' (for the New Zealand Government); 'Truth' (German Government); 'Joan of Arc' (bought by French Government); 'Lear and Cordelia'; etc.

Joy, Thomas, American colonist: b. Norfolk, England, 1610; d. Boston 1678. Upon emigrating to America in 1635 he established himself in Boston as an architect and builder, and in 1657 erected the Townhouse of Boston, the earliest civic structure of any note in New England. In 1646 for his share in the 'Child Memorial,' protesting against both the civil and ecclesiastical government of the Bay Colony, he was fined and imprisoned.

Joyce, Robert Dwyer, Irish poet and physician: b. in County Limerick, September 1836; d. Dublin 23 Oct. 1883. In 1866 he came to the United States and practised medicine for several years in Boston, Mass., contributing during that period to the 'Pilot' and other Irish journals. He published 'Ballads, Romances, and Songs' (1872); 'Deirdre,' a much admired epic poem, which appeared anonymously as one of the 'No Name Series' (1876); 'Legends of the Wars in Ireland' (1888); 'Fireside Stories of

Ireland' (1871); 'Blanid,' a poem (1879); 'The Squire of Castleton'; etc.

Joyeuse Entrée, zhwā-yēz öñ-trā, the name given to the important privileges of the estates of Brabant and Limburg, with Antwerp, which the dukes were obliged to swear to maintain before they were allowed to enter the ducal residence, from which circumstance the name was taken. The most important of these privileges was that the people were released from an allegiance whenever the duke should attempt to violate their rights. So important were these privileges considered that many women went to Brabant to be confined there, that their children might enjoy the rights of a citizen of Brabant.

Joynes, Edward Southey, American educator: b. Accomac County, Va., 2 March 1834. He was educated at the University of Virginia and at Berlin, in 1858 was appointed professor of Greek at William and Mary College, in 1866-75 was professor of modern languages at Washington College (now Washington and Lee University, Lexington, Va.), and subsequently held chairs in Vanderbilt University and the University of Tennessee. In 1882 he became professor of modern languages in South Carolina College (Columbia). He published text-books of French and German, most important of which is the 'Joynes-Meissner German Grammar' (1887).

Juan Fernandez, joo'an fér-nän'déz (Sp. hoo-án' fér-nan'déth), so called from the name of its discoverer, also sometimes Más-á-Tierra, an island in the South Pacific Ocean, about 350 miles west of the coast of Chile, to which it belongs. It is 12½ miles long and 5 miles broad at the broadest part, mountainous, and of rugged aspect. Parts of it are fertile, producing various kinds of timber, peaches, figs, grapes, cherries, etc. There are excellent fish. The island is inhabited by a few settlers, whose chief occupation is the providing of fresh vegetables, water, and wood for the whaling or other vessels that call here. Defoe is said to have founded his 'Robinson Crusoe' on the history of the solitary residence here for over four years (1704-9) of a Scotch sailor, Alexander Selkirk.

Juan de Fuca, joo'an dě fū'ka (Sp. hoo än' dā foo'kā), Strait of, an ocean passage between the State of Washington and Vancouver Island. It connects the Pacific with the Strait of Georgia on the north and Puget Sound on the south. It is 100 miles long and about 15 miles wide. It contains several islands, some of which were at one time in dispute between the United States and Great Britain.

Juarez, Benito Pablo, bā-nē'tō pāb'lō hoo-ä'reth, Mexican statesman: b. San Pueblo Guelatao, Oajaca, 21 March 1806; d. Mexico 18 July 1872. He was admitted to the bar in 1834; became a judge of the civil court in 1842; in 1847-52 was governor of the state of Oajaca, in which post he greatly improved provincial conditions; and after a period of exile (1853-5) joined the revolutionists under Alvarez, by whom he was later made minister of justice and ecclesiastical affairs. In 1855 he was appointed provisional governor of Oajaca by Comonfort, the successor of Alvarez, and in 1857 elected constitutional governor. He was made secretary of the interior and chief justice in the latter

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year (the office of chief justice being by the constitution the equivalent of a vice-presidency), and when Comonfort was driven from power (1858), duly succeeded to the presidency, was recognized by the Mexican states and the United States, but was opposed by the conservatives in a long civil war, and did not enter Mexico City until 11 Jan. 1861. In March he was elected president for a four-years' term. The bankrupt government published a decree suspending for two years the payment on the foreign debt, and an alliance of intervention was at once entered into by England, Spain, and France. On Juarez' agreement to protect the interests of foreign debtors, the English and Spanish troops evacuated the country, but France proceeded to a war of conquest. Juarez was driven to the extreme north and Maximilian assumed imperial power. Upon the interference of the United States, however, the French troops were withdrawn in 1867, and in the same year Maximilian was executed and Juarez elected president. He was re-elected in 1871. His vigorous and liberal policy was of great benefit to the nation, and he has sometimes been called the "Mexican Washington." Consult Baz, "Vida de Benito Juarez" (1874); and the "Life" by Burke (1894).

Juarez Celman, Miguel, mē-gēl' hoo-ā'rēth sāl-mān', Argentine statesman: b. Cordoba, Argentina, 29 Sept. 1844. He was graduated from the university of Cordoba in 1870 and after holding several political posts became governor of his province of Cordoba, and in 1884 a senator in the national Congress. In 1886 he was chosen president and the speculation rife during his administration, as well as the inflation of the currency and the magnitude of the public works undertaken at this time, induced a financial panic in 1890. The Celman administration was held responsible for this disaster and the president himself charged with having amassed a fortune from sums known to have been taken from the treasury. The cabinet resigned, but revolt broke out in Buenos Ayres 26 July 1890, and fighting in the streets continued for several days. On 6 August, however, the president resigned and the vice-president, Pellegrini, assumed his duties for the remainder of the term.

Juba (joo'bā) Islands. See DUNDAS ISLANDS.

Juba River, in eastern Africa, a large stream which flows into the Indian Ocean at about lat. 0° 5' S. Its mouth marks the north boundary of the coast placed under British control by the agreement with Germany in 1890. The river has been explored to beyond lat. 3° N., and Cecchi identifies the Umo as its upper waters; so that it probably takes its rise in the same mountains as the feeders of the Nile.

Jubal, joo'bal, or **Jabal**, son of Lamech and Adah. According to Genesis iv. 21, the inventor of the reed-flute and harp or lyre, and the father, or predecessor, of all them who play upon such instruments, that is, the discoverer of musical science.

Jubilee, an observance among the Jews which recurred every fiftieth year; the land was to rest, as in sabbatical years; land and houses in the open country and in unwalled villages reverted to their original owners or the heirs

of such; all slaves were to go free. The law as a whole was distinctly theocratic; it vindicated the absolutism of Jehovah; it meant that Hebrews were the servants of Him, and could not therefore continue to be the slaves of their fellow men; the land belonged to Him, and was only lent to the Hebrew tribes and families, who could not therefore be driven out by any human arrangement.

In the Roman Catholic Church a Jubilee occurs every twenty-fifth year in which the Pope proclaims a remission, from Christmas to Christmas, of the penal consequences of sin, on condition of repentance, restitution and the performance of certain pious works. The first Roman Catholic Jubilee was given in 1300.

Juch, yook, **Emma Johanna Antonia**, American opera singer: b. Vienna 4 July 1803. She came with her parents to the United States when an infant and was educated in the public schools of New York. She studied singing under Murio-Celli for three years, making her concert début in Chickering Hall, New York, and her operatic début as Felina in "Mignon" in London 1881. She sang for three seasons in the Mapleson opera company, and under the management of Theodore Thomas in the United States sang the part of Elsa in "Lohengrin" on alternate nights with Nilsson. She was the prima donna of the American Opera Company for three seasons, and has sung in the Emma Juch English Opera Company and other organizations. She was married in 1894 to Francis L. Wellman, of New York.

Judaism, Reformed, in America finds its roots in the beginning of the Reform movement that took place in Germany in the first quarter of the 19th century. The cause of the religious advance of the Jew in Europe was the breaking up of the Ghetto in the latter half of the 18th century. As long as the Jew was excluded from the world, its culture and its opportunities, he found his greatest comfort in his Hebrew studies and in his religion. The latter developed only along its own narrow lines and was protected from every admixture of foreign elements. The Jew, as it were, built a "fence around the law." When the bars of the Ghetto fell and the Jew was initiated into a new world of thought, language, literature and activity, he found the old religion incongruous with modern life and the rabbinical law too rigid for the new conditions. Reconciliation between the two was difficult. A bitter struggle ensued between the old religion and the new life. A compromise was the only solution. Judaism was equal to the demand. Heartburnings, personalities, domestic schism, often followed in the wake of innovations. The wheels of progress, however, could not be stayed.

Moses Mendelssohn translated parts of the Bible into German and thus opened up a new field of study for the Jew. This was followed by a translation of the Prayer Book into German by David Friedlander. The Talmudic regulations were either openly isolated or interpreted in a liberal spirit. Religious schools for instructing the younger generation in the principles and practices of Judaism as well as in the literature and history of Israel, were instituted and conducted according to modern pedagogical methods. Religious services in many

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synagogues were modified, rituals were shortened, objectionable features were omitted, and prayers, sermons and hymns in the vernacular were introduced. Israel Jacobson was the first who successfully established reformed religious schools and services in Germany and later built a Reform Temple at Sessan, which was consecrated 17 July 1810. This Reform movement soon spread to Berlin and Hamburg and before long it reached America and found expression here in 1788 in the city of Charleston in the organization of the "Reform Society" of Israelites, which instituted divine services that consisted of a short ritual with sermons, etc., in English and the abolition of offerings during the divine service. A great ecclesiastical battle resulted and many questions of reform were delayed for several years. An organ was purchased and the system of family pews adopted in spite of much opposition. It may here be mentioned to the everlasting credit of Reformed Judaism, that it instituted family pews and gave to women the right to worship in the same pew with their husband and sons. The practice of the orthodox wing, which still prevails in many congregations, of isolating women in a screened gallery, is both improper and without warrant in this age of enlightenment. Reform differs further from Orthodoxy in the interpretations put upon the Scriptures and the Talmud and the authority with which they are severally credited. Orthodoxy gives to both Scripture and Talmud a binding authority over Jews without regard to circumstances of time and place. Reform seeks to set up a higher standard of authority than merely the literal texts and to find a way of reconciling ancient laws and traditions, if possible, with modern requirements. The usual custom of Reformers is to be reasonable and to discriminate between the essentials and the non-essentials of Judaism. Reformed Judaism has discarded belief in bodily resurrection, in the coming of a personal Messiah, in the national restoration of Palestine and the re-institution of the ancient temple with its Levitical cults. Reformed Judaism is also manifested in a refusal to abide by the rigorous enforcement of the Mosaic and Rabbinical dietary laws and in certain changes in the ritual and religious observances. The reform instituted at Charleston soon spread to the North where in the city of New York the Temple Emanu-El was organized in 1845 under the leadership of Rev. Dr. Leo Merzbacher who formed his own ritual for the congregation. Temple Emanu-El has led the van of the Reformed Jewish congregations of America for over half a century and has given much impetus to the progress of Israel. Under Dr. Samuel Adler and Dr. Gustav Gottheil, this congregation made vast strides and is now the largest and wealthiest Jewish congregation of the world. Its place of worship is situated at the corner of Fifth Avenue and 43d Street, and its present rabbi is the Rev. Dr. Joseph Silverman. Har Sinai congregation was soon organized in Baltimore under the banner of Reform and adopted the prayer book of the Hamburg Temple. Some of its noted rabbis were Dr. David Einhorn, Dr. Samuel Sale, Dr. D. Philipson, and Dr. F. Shanfarber. The present incumbent is Rabbi Charles Rubenstein. A stronger note than all these, however, was

sounded in the early days of reform at Albany where Rev. Dr. I. M. Wise officiated from 1846 to 1854. He had come from Germany, impregnated with the new spirit of progress, and at once carried his cherished ideals into practice in this country. He fought some of the early battles of Reform in America which went far beyond the expectations or desires of the Reformers of Europe. He contended for choir and organ and for a prayer book in the vernacular and his *Minhag America* (the American Ritual) was acceptable to most American Reform congregations for almost 50 years. It later became the basis of the Union Prayer Book now generally in use. Wise was not alone in his strenuous battles for progress. Leo Merzbacher, Max Libenthal, Samuel Adler, David Einhorn, and Samuel Hirsch ably entered the lists and contributed valuable aid to the new movement. These men were later reinforced by such valiant Reform leaders as B. Felsenthal, J. K. Gutheim, and Gustav Gottheil. Rev. Dr. Isaac M. Wise rightly called the father of American Reformed Judaism, gave to this movement a greater impetus than it had ever received, when in 1873 he organized the Union of American Hebrew Congregations and under its auspices, in 1875, the Hebrew Union College, a theological seminary for the training of American rabbis. A great drawback to the progress of the reform element was the lack of leaders and rabbis with modern scholastic education who could enter into the spirit of American conditions and the needs of Israel in this country. In the last 25 years over 100 graduates of this college have found pulpits in reform congregations where, with their modern culture and the ability to appeal to the younger generation, they have had eminent success and have given reformed (or Progressive Judaism, as it is sometimes called) a firm foothold on American soil. The Union of American Hebrew Congregations is now actively engaged in providing circuit preachers for small congregations and in organizing congregations and religious schools in communities where none exist. Another source of active strength to Reformed Judaism has been the Central Conference of American Rabbis, which the late Rev. Dr. I. M. Wise called into existence in Detroit in July 1889. This had been preceded by several Reformed Rabbinical Conferences which from time to time discussed burning ecclesiastical and ritual questions. The most noted of the conferences was the Pittsburg Conference held in November, 1885, at which the following platform of Reformed Judaism was adopted and which in the main, has been approved by nearly all Reformed Rabbis and teachers and been generally accepted by the laity.

Act. 1.—Judaism conveys the highest conception of God and of his relation to Man. God is the Creator and Ruler of the world, Father and Educator of the human race.

Act. 2.—The Holy Scriptures are the record of Divine Revelation and of the consecration of the Jewish people as the missionaries of the one God. In composition and literary arrangement the Scriptures are only the work of men with the unavoidable limitations of their age.

Act. 3.—The results of natural science are the best helps to the understanding of the working of Divine Love in the world, the Bible serv-

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ing as guides to illustrate the working of Divine Power within us.

Act 4.—The Mosaic laws are intended for the training of the Jews of Palestine in their former surroundings; only the moral laws are divine; all social, political, and priestly statutes, inconsistent with our modern habits and views, are to be rejected.

Act 5.—The Mosaic-rabbinical laws on diet, purity and dress fail to imbue modern Jews with the spirit of priestly holiness; their observance to-day would obstruct rather than enhance moral and spiritual elevation.

Act 6.—Israel's Messianic hope relates to the establishment of the authority of peace, truth, justice and love among men. No return to Palestine is expected, nor the re-institution there of a Jewish state, or of a worship conducted by descendants of Aaron.

Act 7.—Judaism is an ever growing, progressive and rational religion of modern civilization and asserts the necessity of preserving identity with the great past of the Jewish nation.

Act 8.—Judaism hails the efforts made by various religious denominations toward removing the barriers separating sect from sect.

Act 9.—It is the duty of Jews to spread the knowledge of their religious truths and mission amongst Jews and non-Jews.

Act 10.—The present agitated state of Judaism is a period of transition from a blind belief in authority and exclusion to a rational and humanitarian conception of religion; the masses, therefore, should be enlightened as to the history and mission of the Jewish people and their social and spiritual condition elevated through press, pulpit, and school.

The Central Conference of American Rabbis has, under the regime of its founder and first president, Dr. I. M. Wise (1889-1898), and its second president, Dr. Joseph Silverman (1899-1903), formulated many decisions which have been put into practice by the people at large, the most important of which are the abrogation of circumcision for adult proselytes, permission to the rabbis to officiate at cremations, the interdiction of rabbis from officiating at intermarriages (between Jews and non-Jews), etc. The most important work of the Conference has been the publication of the Union Prayer Book and Union Hymnal both of which have become very popular and have been the means of bringing unity into the religious services of almost 200 reformed congregations and of abolishing the many different rituals which had been a source of confusion in modern Judaism. Of late years some reformed congregations have been holding Sunday services in addition to the regular Sabbath services and many people have had grave fears lest this movement might lead to the substitution of Sunday for the Jewish Sabbath. The Central Conference of American Rabbis at its convention at Detroit July 1903, allayed those fears by adopting a resolution to the effect that this Conference favors adherence to the historical Sabbath as the fundamental institution of Judaism, and that Sunday services, whenever held, must only be regarded as supplementary to the regular Sabbath services. The future of Reformed Judaism in this country is pregnant with great possibilities. It is to be shaped, in the main, by the Union of American

Hebrew Congregations, the Central Conference of American Rabbis and the Hebrew Union College (Cincinnati, O.) presided over by Dr. K. Kohler, the successor of Dr. I. M. Wise, and by the graduates of this college of whom the older and more prominent are: A. Aaron, H. Berkowitz, Jos. Krauskopf, Louis Grossman, R. Grossman, M. Heller, David Phillipson, Jos. Stoltz, Jos. Silverman. Among the scholarly and leading Reform rabbis of America may be counted E. G. Hirsch, K. Kohler, S. Sale, Leon Harrison, I. S. Moses, M. Samfield, J. Vooranger, S. Shulman, M. H. Harris. It is hoped that the new Jewish Theological Seminary of America (New York), Dr. S. Schechter, President, will also in time add power and influence to progressive Judaism in America, notwithstanding its present conservative tendency. The main problem for the reformers of the future will be how to promote assimilation with modern conditions without sacrificing the integrity of Judaism. Consult: 'Reports of the Union of American Hebrew Congregations'; 'Reports of the Central Conference of American Rabbis'; 'Yearbooks of the American Jewish Historical Society'; 'Reminiscences of I. M. Wise'; Phillipson Grossman, 'Life and Writings of I. M. Wise'; Kohler, 'Settlement of Jews in North America'; and 'The Jewish Encyclopedia.'

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Judas, or Jude, one of the twelve apostles. He appears in the apostolic catalogue of St. Luke as "Judas of James," that is, son or brother of James; in St. Mark's and St. Matthew's list he is styled Thaddæus, of which Judas may be an abbreviation. Nothing is known of his life except what is ascribed to him by widely spread tradition. According to western legend he went in company with Simon the Canaanite to evangelize the Persians, and closed his life by martyrdom. In the calendar of the Book of Common Prayer as well as in the Roman Catholic calendar the festivals of St. Simon and St. Jude occur together on 28 October, and in the Greek Church on 16 May.

Judas Iscariot, is-kär'i-öt (that is, of the family of Cariot in the tribe of Judah). One of the twelve apostles of Christ. He is styled the son of Simon, and was treasurer to the little company that attended Jesus, whom he betrayed with a kiss into the hands of the Jewish priests, for thirty pieces of silver. His divine Master addressed to him the mild reproof—"Dost thou betray the Son of Man with a kiss?" Remorse drove him to suicide. Nothing is known of his life previous to the appearance of his name in the lists of the apostles.

Judas Maccabæus, mäk-a-bé'üs. See MACCAEBS.

Judas-tree. See CERCIS.

Judd, Garrett Parmlee, Hawaiian statesman: b. Paris, Oneida County, N. Y., 23 April 1803; d. Honolulu, Hawaiian Islands, 12 July 1873. In 1828 he went to Honolulu as a medical missionary, and in 1842 was appointed recorder and interpreter to the native government. He organized the first Hawaiian ministry for Kamehamaha III. in 1843, and held the portfolio of finance from 1844 until his retirement in 1853. He placed Hawaiian finance on a sound basis,

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and was a predominant influence in native politics.

Judd, Norman Buel, American lawyer and politician: b. Rome, N. Y., 1815; d. 1878. After studying law he was admitted to the New York bar in 1836 and at once going to Chicago began practice there, being the first city attorney of that city. He sat in the Illinois legislature 1844-60, becoming a member of the Republican party in 1856. He was minister to Prussia 1861-5, and was successful in preventing Prussia from recognizing the Confederacy. He was collector of the United States customs at Chicago in 1873 and was long prominent as one of the foremost railway lawyers in the country.

Judd, Orange, American journalist: b. near Niagara Falls, N. Y., 26 July 1822; d. Chicago, Ill., 27 Dec. 1892. He was graduated from Wesleyan University in 1847, became editor of the 'American Agriculturist' in 1853, was its owner and publisher in 1856-81, and in 1855-63 was also agricultural editor of the New York *Times*. At Chicago he edited the 'Prairie Farmer' (1883-8), which became the 'Orange Judd Farmer.' In 1871 he gave to Wesleyan University the Orange Judd hall of natural science, in which he established in 1875 the first State agricultural experiment station. He did much to promote American agriculture.

Judd, Sylvester, American author and Unitarian clergyman: b. Westhampton, Mass., 23 July 1813; d. Augusta, Maine, 20 Jan. 1853. He was graduated at Yale College in 1836, and subsequently becoming a Unitarian studied theology at the Harvard Divinity School. In 1840 he was ordained as pastor of the East parish in Augusta, Maine, and continued to hold that pastorate till his death. In 1845 he published 'Margaret, a Tale of the Real and Ideal,' a very noteworthy example of American fiction, to which Lowell in his 'Fable for Critics' makes extended allusion and which was illustrated by a much admired series of outline drawings by Felix O. C. Darley (q.v.) (1856). In 1850 he published 'Philo, and Evangeliad,' a didactic poem in blank verse, and in the same year 'Richard Edney,' a romance. 'The Church,' a collection of sermons, appeared in 1855.

Jude, jood. See *JUDAS*.

Jude, Epistle of, a general or ecumenical letter reckoned among the canonical writings of the New Testament. The writer, while speaking with something like apostolic authority, does not claim to be an apostle. He is merely "the brother of James," probably James the Just, the author of another general epistle. Difficulties have been raised about this book because of its resemblance to II. Peter, and it is quite uncertain which epistle was written first. It also contains references to two apocryphal books, the 'Assumption of Moses' and the 'Book of Enoch,' but as in the New Testament citations are made not only from uninspired, but even from heathen writers, this does not impair the authority or authenticity of the epistle. As to its date, the earliest probable is 64 A.D. and the latest 67 or 68 A.D. The contents include address and salutation; false teachers are condemned, their fate illustrated by Biblical examples; their wickedness specifically described and woe is pronounced upon them. The letter concludes with an ex-

hortation, to consider how the apostles predicted the coming of these mockers; to cling to the love of God; to treat such perverted ones with discrimination.

Judge, a public officer to whom is committed the exercise of judicial power of the State in the administration of justice in its courts. It is his province to decide questions of law, and in cases in which facts are to be decided by a jury to instruct the jury as to the law which is applicable and to point out to them what the exact questions for their determination are. (See *JURY*.) He pronounces the sentence, or enters the judgment, of the court. It is to be understood that the foregoing is an attempt to state the functions of a modern judge. In the early stages of society there are complexities of social relations which disappear with advancing civilization. In England, for example, there were formerly local courts and ecclesiastical courts, the judges of which can scarcely be said to have exercised the power of the state, if by state we mean the general government; nor were the judicial powers entirely distinct from the administrative. (See *JURISDICTION*.) But from the time when the King's Court began to assume importance in the 12th century, and to be held by professional judges, the judicial office began to approach its modern character. This character had long been established when the United States government was formed.

The word is not a technical one. The officers of the King's Court, when that tribunal began to take definite shape, were known officially as justices. Until the recent Judicature Acts in England it was customary formally, as well as popularly, to speak of the Judges of the superior courts at Westminster, though the members of the courts of King's Bench and Common Pleas were properly justices, and of the Court of Exchequer barons, and at the present time the members of the Supreme Court of Judicature, including the Lord Chancellor, the Lord Chief Justice, the Master of the Rolls and the Lords of Appeal are spoken of as the judges of that court. English judges are appointed by the Crown (this patronage being exercised by the Lord Chancellor, who is the head of the legal profession) from the leaders of the Bar, and hold office during good behavior.

In all the Federal courts, in all the higher courts of the several States and in most of the inferior courts, judges must be trained in the law, though lay judges were common in the State courts of first instance until quite recent times. Federal judges are appointed by the President, by and with the advice and consent of the Senate, and hold office during good behavior, being removable only by impeachment. Any Federal judge who has served for ten years and is 70 years of age may retire on full pay for life. The choice of judges in the States is determined by the State constitutions. As a general rule they are elected for a term of years. The fear was quite generally expressed at the time the tendency to make the office an elective one became general, that judges so chosen would be inferior to those appointed by the State governors, but does not seem to have been justified by the result. In most of the State courts the small salaries paid and

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the limited terms of office prevent the leading members of the bar from seeking, and in many cases from accepting, the office of judge.

A judge must be impartial and any interest in the cause or the parties will disqualify him from presiding at the trial. While in office he is precluded from practising before the court of which he is a member, and he is commonly, and should be universally, precluded from practising before any court. He is not answerable to any suitor for the correctness of his rulings or decisions, and in the absence of positive fraud is not answerable in damages for any decision he may render. Every judge has power to punish for contempt of court in case of acts committed during the court's session, and even of such acts committed outside the court, though this latter power is to be exercised with care, and its limits are naturally not defined with certainty. For the peculiar functions exercised by American judges as interpreters of the Federal and State constitutions, see JURISDICTION.

Consult: Pollock and Maitland, 'History of English Law'; Blackstone, 'Commentaries' (Bk. III., ch. 4); Brodie-Innes, 'Comparative Principles of the Laws of England and Scotland' (Bk. I.); Kent, 'Commentaries'; Cooley, 'Constitutional Limitations.'

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Judge-advocate, a title given the prosecutor in a court-martial or military commission. In the United States the judge-advocate is generally a member of the judge-advocate-general's department. In Great Britain the duties of judge-advocate usually devolve upon a detailed staff officer, or the prisoner's commanding officer. The prisoner has a right to call on any regimental officer to speak in his behalf. See LAW, MILITARY.

Judge Lynch. See LYNCH LAW.

Judges, Book of, a book of the Hebrew scriptures which relates the exploits of successive rulers of Israel who delivered the land from the heathen, 'judge' in the Hebrew sense being used to designate the defender of a cause, and not necessarily a judicial magistrate. These judges were raised up at times of national emergency to assert the independence of the nation. Abimelech attempted to maintain the succession to this office as being the son of Gideon, but he failed, and the office was never hereditary. Samuel did indeed appoint his sons judges, but the government was at that time undergoing a transition to the settled form of hereditary dynasty.

The period comprised in the book of Judges is from Joshua to Samuel and Saul. In 1 Kings vi. 1, it is stated that from the Exodus to the building of the first temple was 480 years, and the time enumerated by the writer of the Book of Judges amounts to 410 years, but on the very probable hypothesis that some of these judges were of merely local authority, and judged Israel contemporaneously, this will be reduced to 299 years. As the accession of Saul is reckoned at 1037 B.C., we may roughly estimate that the judges ruled Palestine from 1336 to 1037 B.C. The book opens with a preliminary review of the condition of the tribes at the close of Joshua's

wars, for the purpose of showing how imperfectly they had carried out the command "Go in and possess the land." The succession of judges, occupied in repelling the encroachments, is the result of this dilatoriness and neglect. The main section of the work is taken up with the exploits of the judges, namely Othniel, who broke the yoke of Mesopotamia; Ehud, who threw off the oppression of Moab; Deborah and Barak, who drove off the northern Canaanites; Gideon, who repelled the Midianites; Jephthah, who fought with the Canaanites; and Samson, who contended with the Philistines. In regard to the public services of the other six we are told little. These are Shamgar, Tola, Jair, Ibzan, Elon, and Abdon. As an epilogue or appendix comes in the stories of idolatrous Micah, and the hideous outrage at Gibeah. The experience of Israel under the judges was educative. In their distress they appeal to Jehovah for deliverance and every answer to their prayer is a rebuke to their forgetfulness and a reminder of their duty to conquer and possess the land.

Judges' Cave, a crevice between some large fallen rocks on West Rock, New Haven, Conn., now a municipal park, which in 1661 was a temporary hiding-place for Goffe and Whalley, two of the English regicides.

Judgment, the decision rendered by the authority to which a question or issue has been submitted for determination. In a more restricted sense, the decision by a court of law of an issue raised by parties litigant, or the determination and declaration by such court of a legal right. There are many rulings by such a court which are not judgments, but determine merely some incidental question, and there are judgments which are interlocutory, as well as final judgments which put an end to the controversy. But every judgment in a judicial proceeding is an adjudication by the court of some right of a suitor, and until set aside or reversed, is the law governing such right.

In early times the solemn character of a court record and the means which the law furnished for the enforcement of an obligation thus established caused such a record to be adopted for the purpose of entering into an obligation as distinguished from resort to a court for the vindication of the obligation when disputed by the other party. A modern survival is found in the confession of judgment, by which a man causes his obligation to pay a sum of money to be entered upon the court records in the form of a judgment against him for the amount due. In consequence of the early practice—aided also by the fact that a judgment may be sued upon outside the jurisdiction of the court in which it was entered, like a contract—the older legal writers speak of judgments as a species of contract. But this classification has been shown to be unscientific by recent writers, since the courts have pointed out that these obligations are not contractual in either their origin or their incidents, and it is now customary to speak of them as *quasi-contracts*.

It is stated above that a judgment is interlocutory or final. In a suit for partition of real estate a judgment that partition be made is interlocutory, and is the basis of further

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proceedings which result in the final judgment establishing the partition. A final judgment is one which ends the controversy, at least as to some of the parties. It is a general rule that no appeal can be taken, except from a final judgment, and while there can rarely be a case of doubt as to the finality of a technical judgment, that is the decision rendered by a court of common law jurisdiction, questions frequently arise as to the finality of decrees (which correspond to judgments) entered by courts of equity. The test is whether the right is finally settled by the decree; for example, when a creditor has claimed to intervene in an equity proceeding to establish his right to share in a fund being distributed, a decree excluding him is final as to him and appealable, though in all other respects the suit remains undetermined by the court below.

A judgment of a competent court having jurisdiction of the parties and the subject matter is conclusive, except so far as it may be the subject of appeal to a higher court. The direct issue thus determined will not be re-tried by another court, and such a determination cannot be attacked collaterally except on the ground of fraud or lack of jurisdiction of the court in which the judgment was rendered. A judgment *in personam* binds only parties to the cause and those in privity with them; a judgment *in rem*, which is a judgment determining the *status* of person or property, binds all the world. Decrees of courts of admiralty are judgments *in rem* and conclusive of the *status* of the subject-matter of the cause upon every one. Decrees of divorce are judgments *in rem*, and determine the *status* of the parties to the proceeding. In the United States they are pronounced by the State courts in the administration of very diverse statutes relating to the subject of divorce, and as the courts of all the States, in addition to the general principles of comity observed between courts of different jurisdictions, are bound by the mandate of the Federal constitution requiring that "Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State" many perplexing questions have arisen. These cases afford good illustrations of successful collateral attacks upon judgments on the ground of fraud or lack of jurisdiction of the court entering the judgment. It is now well settled that a decree of divorce may be successfully attacked collaterally on the ground of fraudulent collusion between the parties or lack of jurisdiction of the court pronouncing it over the person of the defendant. It is to be observed that a final judgment is conclusive of the particular cause, and finally determines the right therein litigated, and may be pleaded in bar of any future attempt to assert the right, except in a case in which there has been no determination on the merits; as for example, where the plaintiff has suffered a voluntary non-suit, that is, has elected in advance of a verdict to abandon his case. He loses that particular case and must pay the costs, but is not prevented from bringing another action.

In most of the United States a judgment for a sum of money found to be due, from the date of its entry, and without the issuance of a writ of execution, constitutes a lien upon the real estate of the judgment debtor; that is,

a claim which must be paid out of the proceeds of any judicial sale of the property in its due order of priority as compared with other liens upon the same property. This lien usually extends only to real estate within the jurisdiction of the court in which the judgment was entered with provision for filing a transcript to create a lien in other counties of the same State in which the debtor owns real estate. A foreign judgment, in which are included the judgments of others of the United States, must be sued on and a judgment recovered upon it to make it effective in any of the States. In such suit no defense which could have been interposed in the original suit will be allowed to the judgment debtor.

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Judica, joo'di-kä ("judge," or "give sentence"), the first word in the 43d Psalm, used as an introit in the Church of England (1549) for the 3d Sunday in Lent, and in the Roman Catholic Church for the 5th Sunday in Lent. Hence "Judica Sunday" as a term to designate those several days.

Judiciary, that branch of government concerned with the administration of justice, in cases civil or criminal; the system of courts of justice in a country; the judges collectively. For judiciary in the United States, see COURT.

Judiciary in the Philippines. The United States government organized in 1902 a complete judicial system covering the whole archipelago, the municipal code providing for the trial of violators of municipal ordinances by the local *presidente*, other special laws authorizing the appointment of justices of the peace for trial of minor offenses, civil actions involving small amounts and the preliminary investigation of higher crimes, creating courts of first instance that are courts of record and of general jurisdiction, one being provided for each province, except in the city of Manila, where there are two judges. The courts of first instance hold sessions at least twice a year in the smaller provinces and in the more important ones three or four times. The archipelago is divided into 14 judicial districts outside the city of Manila, one judge for each judicial district, with a special tribunal for disposing of arrearsages of litigation in the island of Negros. There is a Supreme Court, consisting of a chief justice and six associate justices, with adequate provisions for reporting the decisions of the court, and for representation of the government, general and local, in all litigation by the attorney-general, solicitor-general and their assistants, and provincial fiscals, with a special municipal system of courts for the city of Manila and with a notarial system for the archipelago. A considerable number of the judges in the various courts are native Filipinos. All the fiscals, or prosecuting officers in the islands are natives.

Judith, Jewish heroine. She was the widow of Manasses, a citizen of Bethulia. When Holofernes, general of King Nebuchadnezzar, according to the Book of Judith, besieged Bethulia, a city of unknown geographical position, she went armed with faith in Jehovah to the tent of the invader and was admitted because of her stately beauty. While he slept she cut off his head with his own sword, and thus de-

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livered Israel. This incident has been a favorite subject with artists, for in the first place the Book of Judith is written with abundant literary point and skill and is naturally suggestive to the sculptor or painter. It is the subject of Donatello's bronze group in the Lanzi palace at Florence, and of many pictures, notably that of Cranach in the Dresden gallery, and those of Horace Vernet, 'Judith on Her Way to Holofernes'; and 'Judith in the Tent of Holofernes.'

Judson, Adoniram, American Baptist missionary: b. Malden, Mass., 9 Aug. 1788; d. at sea 12 April 1850. He was graduated from Brown University in 1807, and immediately after opened a private school in Plymouth, Mass. Skeptical views which he had held were overcome by his examination of the evidences of Christianity, and he was graduated from Andover Theological Seminary in 1810. With some of his fellow students at Andover he addressed a letter to the General Congregational association of Massachusetts which ultimately led to the formation of the American board of commissioners for foreign missions. Impatient at the slow progress of the American movement he embarked for England to consult with the directors of the London Missionary Society in regard to co-operation with that society by the newly formed American board. On his return to America he and three others were appointed missionaries to the Burman empire by the American board; they were ordained 6 Feb. 1812 and Dr. Judson, with his wife, sailed on the 19th for Calcutta. They were subjected for a full year to much annoyance by the East India Company's regulations, and finally took refuge in Rangoon (July 1813). Meanwhile they had adopted Baptist views, and had surrendered their connection with the American board. The Baptist general convention (now the American Baptist Missionary Union) organized in 1814 and immediately appointed Mr. and Mrs. Judson its missionaries. Established in Rangoon they applied themselves to the learning of the language, without grammar or dictionary; in April 1819 the first *saya* was opened for Christian worship, and in 1820 the number of baptized converts was 10. The growth of the mission had excited the displeasure of the new viceroy, and Dr. Judson determined to appeal to the king for protection, but the plea was unavailing; later, however, their mission was transferred to Ava, at the request of the king. The sudden breaking out of war between the East India Company and the Burman government brought upon the missionaries the severest privations; in June 1824 Dr. Judson was arrested and thrown into prison, enduring the most brutal treatment until February 1826, when he was released on the demand of Sir Archibald Campbell, the English general. Removing to territory ceded by the Burman government to the English, he and his wife commenced missionary work at Amherst; shortly after Judson went with an embassy to Ava to negotiate a new treaty, and during his absence his wife died. On his return to Amherst he took up again his missionary work, where he was chiefly occupied in the translation of the Bible (completed 1834); and the preparation of a Burman-English dictionary. In April 1834, he married Mrs. Sarah Hall Boardman, and remained in Burma till 1845, when he visited the United States. Mrs. Judson died on

the voyage. He was received in the United States with distinguished marks of respect by public meetings in many cities, especially by the Baptist missionary conventions at New York and Richmond. In July 1846, he again sailed for Burma with his third wife, Emily Chubbuck, and settled at Maulmain; took the pastorate of the Burman church there, and continued his work on the dictionary. In 1849, illness forced him to leave Maulmain, and he died on the voyage to the Isle of Bourbon. Consult: Lives by his son, Edward Judson (q.v.) (1883); Wayland (1853); Conant, 'The Earnest Man' (1856).

Judson, Ann Hasseltine, American missionary, wife of Adoniram Judson (q.v.): b. Bradford, Mass., 22 Dec. 1789; d. Amherst, Burma, 24 Oct. 1826. She was married to Dr. Judson in 1812, and sailed with him to Burma, where she took active part in all his missionary work. Her health compelled her to visit the United States in 1822-3, where her personal appeals were the means of largely increasing the missionary interest in the churches. Shortly after her return to Burma, her husband and other foreign residents at Ava were imprisoned, and she herself suffered many indignities; but by constant appeals to the king and the wise use of money and presents she was successful in relieving somewhat the sufferings of her husband and the other prisoners. She wrote 'History of the Burman Missions' (1822).

Judson, Edward, American Baptist clergyman: b. Maulmain, Burma, 27 Dec. 1844. He is the son of Adoniram Judson (q.v.) and came to the United States in 1850 after the death of his father. He studied at Madison (now Colgate) University, and was graduated from Brown in 1865. He was principal of the academy at Townsend, Vt. (1865-7) and subsequently professor of Latin at Madison (now Colgate) University. In 1875 he accepted the pastorate of the Baptist Church at Orange, N. J., then became pastor of the Berean Baptist Church, New York city, and later secured a site on Washington Square, New York, and erected the Judson Memorial Church (in memory of his father) of which he is pastor. Here he has built up an institutional church, with many different lines of work, including gymnasium classes, a dispensary, and a children's fresh air fund.

Judson, Emily Chubbuck ("FANNY FORRESTER"), American writer: b. Eaton, Madison County, N. Y., 22 Aug. 1817; d. Hamilton, N. Y., 1 June 1854. She was the third wife of Rev. Adoniram Judson (q.v.) to whom she was married in 1846. As "Fanny Forrester" she achieved some little reputation as a writer of graceful sketches and poems, and besides the life of the second Mrs. Judson (1850), published 'Alderbrook' (1846); 'The Kathayan Slave' (1853); 'An Olio of Domestic Verses' (1852); 'Trippings in Author Land' (1846); 'My Two Sisters' (1854).

Judson, Harry Pratt, American educator: b. Jamestown, N. Y., 20 Dec. 1849. He was graduated from Williams College in 1870, was professor of history in the University of Minnesota 1885-92, and has been professor of political science in the University of Chicago since the

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latter date. His works include: 'Caesar's Army, a Study of the Military Art of the Romans' (1888); 'Europe in the Nineteenth Century'; 'The Growth of the American Nation' (1895); 'The Higher Education as a Training for Business' (1896); 'The Government of Illinois' (1900); etc.

Judson, Sarah Hall Boardman, American missionary: b. Alstead, N. H., 4 Nov. 1803; d. St. Helena 1 Sept. 1845. She was married on 4 July 1825, to Rev. George Dana Boardman, and on 16 July they embarked for Calcutta. They established the mission station at Maulmain, and Mrs. Boardman made rapid progress in the acquisition of the language. Transferred to Tavoy for a similar service, they worked among the Karen partly at the schools at Tavoy and partly by visiting their villages in the wilderness. After two years Mr. Boardman died, but she continued her missionary labors, and beside managing a school with great success, was accustomed to make long journeys among the mountains. In these excursions, assemblies of hundreds gathered around her and she conducted the worship and gave them religious instruction. In April 1834, she became the wife of Adoniram Judson (q.v.). She was perfectly familiar with the Burman language, and translated into Burmese the first part of Bunyan's 'Pilgrim's Progress' and various tracts, prepared a hymn book, and several volumes of Scripture questions for Sunday schools. Before the Peguans had a missionary, she acquired their language, and translated or superintended the translation of the New Testament and the principal Burman tracts into the Peguan tongue.

Juggernaut, jūg'ér-nāt. See JAGANNATH.

Jugular (joo'gū-lar) **Vein**, one of the large trunks by which the greater part of the blood that has circulated in the head, face and neck is returned to the heart. There are two on each side, an external or superficial, and an internal or deeper.

Jugurtha, joo-gér'thā, king of Numidia: d. Rome 104 B.C. He was a natural son of Masinissa. Micipsa, his father's brother, and king of Numidia after Masinissa (149 B.C.), adopted him and brought him up with his own sons, Adherbal and Hiempsal. Micipsa did his best to conciliate him, and declared him joint-heir to the crown with his two sons. But after the death of Micipsa, Jugurtha had Hiempsal murdered and drove Adherbal from the country. Adherbal appealed to Rome, and after several Roman expeditions into Numidia, Jugurtha was captured (106 B.C.), led in the triumph of Marius at Rome, and finally thrown into a dungeon, where he was starved to death.

Jujube, joo'joob, a spiny and deciduous shrub of the order *Rhamnaceæ* and genus *Zizyphus*, a native of Syria, whence it was introduced into Europe. The fruit is blood-red or saffron-colored, with a sweet, granular pulp. The species are numerous, and of several the fruit is wholesome and pleasant to eat, both fresh and dried, and forms an article of commerce; and in southern Europe it is used at table in desserts as a dry sweetmeat. *Z. Lotus*, which gave its name to the ancient *Lotophagi*, a shrub 2 or 3 feet high, is a native of Persia and the north of Africa. Its

berries, which are about as large as a sloe, are collected for food by the Arabs of Barbary, are made into cakes, and a kind of wine is sometimes made from them. *Z. spina-christi*, or Christ's thorn, is said to have furnished the branches of which Jesus' crown of thorns was made.

Jujuy, hoo-hwē', Argentine, a province situated in the extreme northwest of the republic, between Bolivia and the province of Salta. Nearly the entire area, estimated at 18,977 square miles, is occupied by mountains in which are extensive deposits of gold, silver, copper, mercury, salt, petroleum, and asphalt. Fertile valleys in the eastern part of the province produce sugar-cane, wheat, tobacco, and rice. There are immense forests and an abundant supply of water. The provincial capital, also called Jujuy, a town of about 10,000 inhabitants, is connected by railway with Buenos Ayres, and has two banks, a custom-house, a national college, a normal school for girls, and 7 public schools. The population of the province, according to the census of 1895, was 49,713. Estimated population in 1903, about 57,000.

Jukes, The, the name given to a family of New York State that had an unusual record of crime and pauperism. In 1874, Mr. R. L. Dugdale, while making investigations in behalf of the New York Prison Association, found several of the same family imprisoned for various crimes. Becoming interested in the subject, he traced the history of the family through several generations; they were descendants of the two sons of a backwoodsman, called Max, who married two of the Jukes sisters, one of whom is known as "Margaret, the Mother of Criminals." Exact information was obtained in relation to 709 out of the 1,200 descendants and blood relations; of these, 140 had been imprisoned for crime, 280 had been paupers, dependent upon public support, and the large majority were of low physical and moral standard. Consult: Dugdale, 'The Jukes.'

Julia, only child of the emperor Augustus; b. 39 B.C.; d. 14 A.D. She was his daughter by his second wife Scribonia, and was first married (25 B.C.) to her cousin, the young Marcellus, and afterward to Marcus Vipsanius Agrippa, to whom she bore three sons and two daughters. On Agrippa's death, in 12 B.C., she was married to Tiberius, who left her on account of her licentiousness. Augustus banished her to Pandataria, a desolate island on the coast of Campania, ultimately allowing her to live in Rhegium. After the death of the emperor, Tiberius treated her with great severity. She died in poverty and distress. Her son, Agrippa, had been put to death by Tiberius shortly before.

Julia Domna, Roman empress: b. Emesa, Syria, 170 A.D.; d. 217 A.D. She was the second wife of the Emperor Severus, and mother of Caracalla and Geta, and a distinguished patroness of art and science.

Julian, joo'lyan, FLAVIUS CLAUDIUS JULIANUS), Roman emperor, surnamed the Apostate: b. Constantinople 17 November 331; d. 26 June 363. When hardly six years old his father and several members of his family were murdered by the soldiers of his cousin, the Emperor Constantius. He was brought up in the Christian religion, studied philosophy and letters,

JULIAN — JULIUS

and resided in Athens, where he was induced to embrace Paganism. Having received command of an army against the Germans, he defeated them at Strasburg, and drove them beyond the Rhine. He also displayed great talent as an administrator in Gaul. The emperor now became jealous of Julian, and recalled his best troops under pretense that he wanted to employ them against the Persians. This order caused a rebellion among the soldiers, who proclaimed their leader Julian emperor in March 360, in spite of his own resistance. Constantius prepared to proceed against him, but soon after died, and Julian was generally recognized as emperor. He began by putting a stop to many abuses, and limiting the splendor of his court, and was thus able to remit to the people the fifth part of all their taxes. He sought to restore the heathen worship in all its splendor, and on that account opposed Christianity as much as was in his power, without, however, persecuting the Christians themselves. In 363 he headed an expedition against the Persians and took several cities. He was an able ruler, and had also a reputation as an author. Some of his works have come down to us, including speeches, letters, and satirical pieces; the latter are distinguished for wit and humor. He wrote also a work against the Christian religion, of which we have yet some extracts. Consult: Schwartz, 'De Vita et Scriptis Iuliani Imperatoris' (1888); Hoffmann, 'Julianus der Abtrünnige' (1880); Gardner, 'Julian: Philosopher and Emperor' (1895); Dill, 'Roman Society' (1899).

Julian, George Washington, American politician: b. Centerville, Ind., 5 May 1817; d. Irvington, Ind., 7 July 1890. He studied law and was admitted to the bar at the age of 21. In 1845 he was elected to the State legislature, as a Whig, but being a strong opponent of slavery he severed his party connection with the Whigs and became one of the founders of the Free Soil party in 1848. In 1849 he was elected to Congress; in 1852 was candidate for vice-president of the Free Soil party, and in 1856 a delegate to the first national convention of the Republican party, where he was vice-president of the convention and chairman of the committee on organization. In 1860 he was again elected to Congress, and served continuously for ten years. He was a member of the committees on the conduct of the war, on reconstruction, on the preparation of the articles of impeachment against President Johnson, and on public lands, being chairman of the latter. He opposed any monopoly of the public lands, was an advocate of the homestead system, and strongly favored giving the franchise to the negro. In 1868 he proposed a constitutional amendment providing for woman's suffrage. In 1872 he joined the Liberal Republicans, and after that became a Democrat; in 1885-9 was surveyor-general of New Mexico; and after 1889 retired from public life. He published 'Speeches on Political Questions' (1872); 'Political Recollections' (1884); and 'Life of Joshua R. Giddings' (1892).

Julian Calendar. See CALENDAR; EPOCH.

Julien, Alexis Anastay, American geologist: b. New York 13 Feb. 1840. He was graduated from Union College in 1859, was resident chemist at the guano island of Sombrero 1860-4,

studied geology and natural history there, and on the establishment of the Columbia School of Mines became an assistant in the quantitative laboratory. He was in charge of the department of microscopy there, 1885-97, and subsequently became instructor in geology. He has published valuable scientific reports included in the Geological Survey's 'Geology of Michigan,' vol. II. (1872); and 'Geology of Wisconsin,' vol. III. (1880); etc.

Julien, zhü-lí-äñ, Stanislas Aignan, French sinologist: b. Orleans 20 Sept. 1799; d. Paris 14 Feb. 1873. Possessed of an extraordinary linguistic faculty, he taught himself Greek, English, Italian, Spanish, Portuguese, and German, and in 1823 commenced the study of Chinese. At the end of a year he published a Latin translation of the philosopher Mencius. Henceforth ancient and modern Chinese, Manchu, the Mongolian tongues, and Sanskrit, were the subjects of exact and profound study. In 1832 he became professor of Chinese at the Collège de France; librarian at the Bibliothèque Nationale, 1839; president of the college, 1855; commander of the Legion of Honor, 1863. His most important works are: 'Voyages des Pérelins Boudhistes' (1853-8); 'Syntaxe nouvelle de Langue chinoise' (1869-70). Julien was the foremost Chinese scholar of his time.

Julius I., pope: d. 12 April 352. He became pope in February, 337, and was a staunch defender of Athanasius, who, under the protection of Julius, sought refuge in Rome against the enmity of the Eastern prelates.

Julius II., pope (GIULIANO DELLA ROVERE, joo-le-a-nô dêl'lâ rô-vâ'râ): b. Albezuola 1443; d. Rome 21 Feb. 1513. He was elevated by his uncle Sixtus IV. to the rank of a bishop and cardinal in 1471, and subsequently held eight bishoprics and the archbishopric of Avignon. He was appointed papal legate to France in 1480 and in 1503 was elected pope. Immediately on his elevation to the pontificate he planned the complete re-establishment of the papal sovereignty in its ancient territory, and the extinction of foreign domination, and influence in Italy. Refusing to attend the Council of Pisa convened by the king of France, he in 1511 formed the "Holy League," to which Spain, England, and Switzerland were parties. In 1512 he made open war against Louis XII., and the Fifth Lateran Council was convoked by him in the same year. The French defeated the papal army near Ravenna, but were soon after driven out of Italy. He was a far-sighted and patriotic sovereign, and a liberal and judicious patron of art and literature. Michelangelo, Raphael, and other great artists of the time receiving commissions from him. To procure means for building St. Peter's he ordered the preaching of indulgences, which was one of the immediate causes of the Reformation. Consult: 'Life,' by Du Mesnil (1873); Brosch, 'Papst Julius II., und die Gründung des Kirchenstaates' (1878).

Julius III., pope (GIOVANNI MARIA DEL MONTE, gö-van'në mä-ré'a dël mòn'tâ): b. Arezzo 10 Sept. 1487; d. Rome 23 March 1555. He was made archbishop of Siponto in 1512 and of Pavia in 1520, and was appointed cardinal by Paul III. in 1536. He took an active part in the Council of Trent as papal legate, was

JULIUS CÆSAR—JUNCTION CITY

elected pope in 1550, and in the following year reopened the Council of Trent, which had been suspended for two years. He endeavored to effect a union with the Nestorians, and commissioned Cardinal Pole to organize, in conjunction with Mary, the reunion of England with Rome.

Julius Cæsar. See CÆSAR, GAIUS JULIUS.

Julius Cæsar, Play of. The material for this stately drama, the noblest of Shakespeare's historical plays, was taken from Plutarch. The action covers nearly two years,—46 to 44 B.C. See CÆSAR, GAIUS JULIUS.

July, the 7th month of the calendar, which in the Roman year bore the name of *Quintilis*, as the fifth in the computation of Romulus, even after Numa had prefixed January and February. Mark Antony effected a change in its name in honor of Julius Cæsar, who was born on the 12th of the month, and thenceforward by a decree of the senate it was called *Julius*. It originally contained 36 days. It is said that Romulus reduced them to 31 and Numa to 30. Julius Cæsar fixed the number at 31, which is still retained. The Dog-days are supposed to commence on the 3d of this month.

Jumbo, the name of a large African elephant for 25 years on exhibition at the Royal Zoological Gardens in London. The animal was purchased in 1882 by P. T. Barnum (q.v.), American showman, for \$10,000, and for three years was exhibited in the United States. Jumbo was killed in 1885 by a railroad train in Canada. He was 11 feet 6 inches in height, and weighed 6 tons. His skeleton is preserved at the Smithsonian Institution, Washington, D. C.

Jumel, zhū'mēl, **Eliza,** American heiress, b. at sea 1769, d. New York 16 July 1865. Her maiden name was Capet, and after her mother's death she was adopted by Mrs. Thompson, of Newport. She was a wayward, beautiful girl; at 17 she eloped with a British officer named Peter Croix, with whom she lived in New York. There she was greatly admired, and soon after her first husband's death married Stephen Jumel, who took her to Paris, where her social success was as great as in New York. After Jumel's death, she married at 61 Aaron Burr (q.v.), from whom she separated soon afterward. Her home during her last years was the famous Jumel mansion, built by Roger Morris in 1758, the home of Mary Philipse Rogers (q.v.) and Washington's headquarters during the New York campaign. It was bought by Madame Jumel in 1810, and is still preserved, its site being in Roger Morris Park, New York, which was opened 28 Dec. 1903.

Jum'na, or Jamna (Sanskrit YAMUNA), a river of India which rises in the Himalayas, at the height of 10,849 feet. It flows in its upper course in a generally southwest direction, then bends to the southeast and, passing the cities of Delhi and Agra, falls into the Ganges, of which it is the chief tributary, at Allahabad (q.v.) after a course of 860 miles. Important irrigation works derive their supply of water from this river.

Jumpers, a class of religionists who manifest their devotion and feeling by jumping from the ground during the time they are assembled for worship and exhortation. They are said to have originated in the Methodist congregations of Wales during the preaching of Whitfield (1760). They were also called "Barkers" from the incoherent guttural sounds they uttered during their excitement. They still exist in some parts of the Eastern States, having emigrated to America after being repudiated by English Methodists.

Jumping Beans, various large seeds of euphorbiaceous plants infested with the larvæ of certain small moths (*Carpocapsa saltitans* and *Grapholitha sebastiana*), which by their movements make the seeds roll, and even jump as if alive. The larvæ spin cocoons in the seeds, a large part of the interior of which they have devoured, and when ready to emerge as adults, push open a previously cut circular door which has been held shut by silken threads. Both species are found in Central America, Mexico, and the southwestern United States, where they are called "broncho beans."

Jumping Hare, or **Springhaas,** a jerboa-like animal (*Pedetes caffer*) of South Africa, as large as a hare, and much resembling one, which is now set apart in a family (*Pedetidae*) by itself. It will leap 25 or more times its own length, and where numerous does great damage at night to growing crops.

Jumping Mouse. See JERBOA.

Jumping Shrew, a curious little animal of Africa, one of the insectivora of the Elephant-shrew family (*Macroscelidæ*), which has very large hindquarters and moves by leaping like a jerboa. They inhabit rocky and desert places, remain in holes and hiding places during the day and go abroad at night in search of insect food. The best known, perhaps, is the Cape jumping-shrew of South Africa (*Macroscelidus typicus*), which is tawny brown, about five inches in length, has a long, flexible proboscis and a long naked tail.

Jumping Spiders, small spiders of the family *Attidæ*, which dwell in low vegetation, and are exceedingly agile. They are usually short and stout in form, rarely more than a quarter of an inch long, and are often brightly colored, especially in the case of the males, which take curious attitudes in order to display their ornaments to the females. Consult Emerton. 'Common Spiders of the United States' (1902).

Jun'co, a genus of slate-colored and white sparrows, present in the United States mostly in winter. See SNOWBIRDS.

Junction City, Kan., city and county-seat of Geary County, at the junction of the Republican and Smoky Hill rivers, 135 miles west of Kansas City; and on the Missouri, K. & T. and the Union P. R.R.'s. The two rivers here form the Kansas River, and make an important shipping point for grain, flour and limestone. A government military post, Fort Riley, is located three miles east of the city. It was settled in 1858 and under a charter of 1870 is governed by a mayor and city council.

JUNE — JUNGLE BOOKS

The city owns the waterworks. Pop. (1890) 4,502; (1900) 4,695.

June, Jennie. See CROLY, JANE G.

June, the 6th month in the calendar. The etymology is uncertain. Vossius gives three etymologies of the name—one from Juno; another from *jungo* (to join), referring to the union between the Romans and Sabines under Romulus and Titus Tatius; a third from *juniores* (the young men), Romulus having been said to have assigned the month of May to the elders, and that of June to the young men, when he divided the people into these two great classes, the former to serve in counsel, the latter in war. The name has also been traced to Junius Brutus, the first consul. It consisted originally of 26 days, to which it is said Romulus added four, and Numa took away one. Julius Cæsar again lengthened it to 30 days, and it has ever since remained unaltered.

June Beetle, or **Fig-eater**, a green and brown beetle (*Allorrhina nitida*) of the family *Scarabæidæ* common in the central and southern United States. The adults often eat figs, peaches, small fruits, corn, etc. The larvæ are white grubs which resemble their northern relatives (see **MAY BEETLE**), but are far less injurious since they normally feed upon decaying vegetable matter in the soil and not on living roots of plants. The adults may be decoyed away from ripe fruit by placing little piles of decaying fruit within their reach; but since they are probably beneficial they should not be destroyed.

June Berry. See AMELANCHIER.

June Bug. See MAY BEETLE.

June Grass. See BLUE GRASS; GRASSES IN THE UNITED STATES.

Juneau, joo-nō', Laurent Solomon, American pioneer: b. L'Assumption parish, near Montreal, Canada, 9 Aug. 1793; d. Shawano, Wis., 14 Nov. 1856. He emigrated to Green Bay, Wis., and thence in 1818 to Milwaukee, where he was active in trade with the Indians. He was not, as has been sometimes stated, the first white settler on the site of Milwaukee. A grant of considerable land had there been made by the Indians to one Mirandeau, a previous resident, and of this grant, Juneau, on Mirandeau's death, secured possession. Juneau made the first survey of Milwaukee village, was its first postmaster and president, and the first mayor of the subsequent city. On ground presented by him, he helped to build the first court-house in the State. For years he was agent for the American Fur Company. A heroic statue of him was placed in Juneau Park, Milwaukee, in 1884. See MILWAUKEE.

Juneau, Alaska, city in the southern district, on a promontory between the Taku River and Lynn Canal, opposite Douglas Island, about 80 miles north of Sitka. It was settled in 1880, is incorporated, and has been selected by Congress as the capital of Alaska. From its situation in the mining region it has become a centre of trade in outfitters' articles and general supplies; while its exports, including gold, furs, and other products of Alaska, have grown to a considerable commerce. Among the manufac-

tories are iron-works, breweries, sawmills, cigar factories, etc. In the vicinity are the Treadwell gold mine and the Silver Bow mines. Villages of the Auk and Taku Indians in the neighborhood are of interest to tourists. At Juneau is the United States land office for Alaska. Its public schools are well conducted, and its water-works, electric-light system, and other public improvements give it all the essential conveniences of a modern American city. Cable service is established here. Pop. (1890) 1,253; (1900) 1,864.

Jung-Stilling, Johann Heinrich, yō'han hin'riх yoong stil'ling, German mystical author: b. Grund, Hesse Nassau, Germany, 12 Sept. 1740; d. Carlsruhe, Baden, 2 April 1817. In the early part of his career he was by turns, a charcoal burner, school master, and tailor, and in 1771 went to Strasburg to study medicine. Here he became acquainted with Goethe, who has sketched him in 'Aus meinem Leben.' He was professor of political economy in the Universities of Marburg and Heidelberg, 1787-1806, and the remainder of his life was passed at the court of the Grand Duke of Baden. His writings, which include several romances as well as distinctly religious works, are more or less mystical in tone. Among them are 'Geschichte des Herrn von Morgenstern' (1770); 'Geschichte Florentins von Fahlendorf' (1783); 'Theobald' (1784-5, an English version of which appeared in New York 1846); 'Das Heimweh'; 'Theorie der Geisterkunde' (1808, in English 1834); 'Scenen aus dem Geisterreiche' (1797-1801), and his famous autobiography 'Heinrich Stillings Leben' (1806). In the publication of this he was aided by Goethe. The work was completed in 'Heinrich Stillings Alter' (1817).

Jungfrau, yoong'frow (Ger. "virgin," or "maiden"), a mountain of Switzerland, in the Bernese or Helvetic Alps, on the frontiers between the cantons of Bern and Valais, 12 miles southeast of Interlaken. It is one of the most magnificent mountains in Switzerland and the loftiest calcareous mountain in Europe; height 13,670 feet. It was first ascended in 1811.

Junghaus, yoong'hows, Sophie, German novelist: b. Cassel, 3 Dec. 1845. She became well known by the publication of 'Kathe, the Story of a Modern Maid' (1876). Later works of hers are: 'The House of Eckberg,' a study of life during the Thirty Years' War (1878); 'Die Erbin wider Willen' (1881); 'Die Gäste der Madame Santines' (1884); 'Der Bergrat' (1888); 'Zwei Bruder' (1889); 'Zu rechter Zeit' (1892); 'Um das Glück' (1896); 'Junge Leiden' (1900).

Jungle, an Indian term applied to a desert and uncultivated region whether covered with wood and dense vegetation or not, but in English it is applied to land covered with forest trees, thick impenetrable brushwood, or any coarse rank vegetation.

Jungle Books, The (1895), by Rudyard Kipling. The central figure in these books is the boy Mowgli, who, straying from his village home when an infant, had been lost in the forest, and there sheltered and nursed with her own cubs by a mother-wolf, and the hairy Orson. Joined to this element of human interest, and with the coloring of high romance, these

JUNGLE-CAT — JUNIPER

stories picture the personal characteristics and social and political life of the gaunt wolf-family in their cave and the free republic of wolves. Unlike the talking beasts in *Æsop's fables*, those of the 'Jungle Books' are not men in hides and on all fours discussing human problems. Kipling's genius represents them thinking and behaving each according to his own peculiar beastly habit and experience, with great dramatic skill.

Jungle-cat, or *Chaus*, the common wildcat of India (*Felis chaus*). It is 26 inches long in head and body, has a short tail, reaching only to the heel, and is yellowish gray, more or less dark and unspotted, tinged with reddish on the sides, marked by a dark stripe from the eyes to the muzzle, and with reddish black ears slightly tufted. Another Indian "jungle-cat" is the handsome *F. ornata*, which is profusely spotted; it dwells in the desert regions of the Northwestern provinces. Both these cats are said to interbreed with domestic cats, and thus no doubt long ago influenced the varieties of the tamed stock.

Jungle-fever, a severe variety of remittent fever, prevalent in the East Indies and other tropical regions. It is characterized by the recurrence of paroxysms and of cold and hot stages. The remissions occur usually in the morning and last from 8 to 12 hours, the fever being mostly typically developed at night.

Jungle-fowl, the English book-name of a genus of pheasants, the source of domestic fowls, characterized by a fleshy frontal comb and wattles, and the peculiarly laterally compressed tail with its long, drooping, curved feathers. This genus (*Gallus*) is represented by several species in southern Asia, especially India, and the Malay and Philippine Islands. The common jungle-fowl (*Gallus gallus* or *bantiva*) is especially noteworthy as the original stock of our barnyard fowls. The wild birds, which are quite common in cultivated parts of central India and about the bases of the Himalayas up to an elevation of 5,000 feet, closely resemble some of the varieties of game cocks and hens. The sexes differ as in the domestic birds in size, character of tail feathers, combs, wattles, spurs and color. Although naturally living in flocks in the jungles and forests, these haunts are often forsaken for the purpose of feeding upon grain in the cultivated fields. They run with great speed, are tolerably good flyers and roost in trees. The cock crows and the hen clucks and cackles much as domestic fowls do. In the wild state the jungle-fowl is said to be monogamous; eggs to the number of 10 or 12 are laid in a simple depression in the ground lined with leaves and grass. Consult Darwin, 'Animals and Plants under Domestication'; Tegetmeier, 'Ibis' (1891); and Blanford, 'Fauna of British India.'

In Australia this name is often given to the mound-birds.

Juniata, joo-ni-ä'ta, a river of Pennsylvania formed at Petersburg, about six miles northeast of Huntingdon, near the centre of the State, by two streams rising in the Alleghany Mountains — the Little Juniata and the Franks-town Branch. Its course is winding, but it flows in a generally eastern direction for about 150 miles, entering the Susquehanna at Dun-

cannon, 14 miles above Harrisburg. Along the greater part of its course the scenery is picturesque, often marked by grandeur where the river breaks through the mountains that rise in parallel ridges across its path. The Juniata is not a navigable stream, but from its source to its mouth its banks are followed by the Pennsylvania Canal and the Pennsylvania Railroad, the latter crossing the river several times.

Juniata College, a coeducational institution, located at Huntingdon, Pa.; established in 1876 under the auspices of the German Baptist Brethren. Special attention is given to the religious education of the students; one of its principal courses is the history and literature of the Bible. It has art, music, normal, and commercial departments, also a preparatory school. The courses lead to the degrees of bachelor of arts, and of English and sacred literature. In 1903 there were in attendance 350 students, and 21 professors and instructors were connected with the school. There were about 21,000 bound volumes and over 4,000 pamphlets in the library.

Junin, hoo-nēn, Peru, department in the interior; has an area of 23,347 square miles. It is located in the wildest parts of the Cordilleras. Agriculture is neglected and large deposits of silver remain unworked. A railroad connects the southern part with Lima on the coast. The capital city is Cerro de Pasco. Pop. of the department 394,393.

Junior Order of United American Mechanics. See UNITED AMERICAN MECHANICS, JUNIOR ORDER OF.

Ju'niper, a genus (*Juniperus*) of ornamental evergreen trees and shrubs of the order *Coniferae*, consisting of about 35 species distributed mainly throughout the cooler parts of the northern hemisphere, but also in America extending to Mexico and the West Indies. The species have branches which spread in all directions from the main trunk and limbs, small, rigid, needle-like or scale-like opposite leaves; unisexual flowers, the two sexes usually upon separate plants, the staminate, yellow and in catkins, the greenish pistillate ones followed by fleshy, berry-like cones containing from one to six, sometimes 12 seeds, which may not attain maturity until the second or third year. The best known species in the United States is probably the Virginian juniper, red cedar or savin (*Juniperus virginiana*), to be found everywhere east of the Rocky Mountains, upon rocky and sandy soils, mountain sides, etc. It often attains 100 feet in height, its upright or spreading branches forming a handsome conical head. Its numerous attractive horticultural varieties are largely planted in parks and cemeteries. The trunks are highly prized for fence posts, being exceedingly durable; the handsome, red, heart-wood is valued for turning, cabinet work, cooperage, and especially for lead-pencils; but the tree is looked upon with disfavor by the orchardist, because it is one of the hosts of apple rust. See APPLE, paragraph *Diseases*.

The common juniper (*J. communis*) is a smaller species, rarely reaching 50 feet in height and usually less than 25 feet tall, and many of its numerous varieties less than 10 feet. It is

JUNIPERO — JUNOT

widely distributed throughout the northern hemisphere, especially in the colder latitudes and altitudes. Like the preceding species its wood is valued, when of sufficient size, for posts, veneers, pencils, and for turning. The tree itself is also used for ornamental planting. Its bark is sometimes twisted into ropes and its long, tough, fibrous roots are used for making baskets. Its blue-black fruit, which it yields profusely, is used for flavoring certain liquors, as is also the oil obtained from them and from the twigs by distillation with water. This oil has been used in medicine as a stimulant, but is less popular than formerly. The Bermuda cedar (*J. bermudiana*) resembles the Virginian juniper, but is of stouter build, though it rarely exceeds 40 feet in height. Its wood is rather more fragrant than that of the preceding species, like which it is used. Formerly it was employed in the ships built in the Bermudas, but the forests which supplied this industry were mismanaged and the industry perished. Several other species are of more or less economic importance; for instance, the Spanish juniper (*J. oxycedrus*), a shrub which attains a height of about 12 feet, whose fruits yield a disagreeable smelling oil (oil of cade), used in veterinary medicine; and African juniper (*J. procera*), a useful timber species and probably the largest of the genus, often attaining heights of 150 feet in the mountains of eastern Africa, where it is native.

Junipers succeed best in moderately moist, sandy loam in open, sunny situations. They make excellent windbreaks and shelter belts, especially where the soil is too dry, rocky or gravelly for other trees. They may be propagated by seeds which, however, usually require two, sometimes three, years to germinate. Cuttings of almost mature wood are taken in the autumn from the needle-leaved kinds and grown under glass or in the open; species with scale-like leaves are generally side-grafted in the greenhouse during winter. Some of the shrubby species are propagated by layers.

Junipero, Miguel José Serra, mē-gēl' hō-sā' sér'rā hoo-nē-pā-rō, Spanish missionary in America: b. island of Majorca 24 Nov. 1713; d. Monterey, Cal., 28 Aug. 1784. He became a member of the Franciscan order in 1729, in 1750 arrived in Mexico City as a missionary, and in 1750-69 was active among the native tribes. In 1769 he went to the site of San Diego Cal., where he founded a mission. He gathered about him a band of sixteen of his order, and these missionaries converted over 3,000 Indians, of whom Junipero himself is said to have baptized more than 1,000. Junipero instructed the natives in the arts of civilization, and the colonies which assembled about the mission stations constituted the first settlements in California. His headquarters were at Monterey, but he founded several other missions. Bret Harte incorrectly gives his name as Serro.

Ju'nius Letters, The. During the period between November 1768 and 21 Jan. 1772, there appeared in the London *Daily Advertiser* a series of mysterious letters aimed at the British ministry of that day, and signed by various pen-names—the most remarkable of them by that of one "Junius." During the century ensuing,

the authorship of these epistles has been assigned with some degree of probability. The merits of the 'Letters' have been sufficient to give them a life all the more vigorous, perhaps, because they have been conjecturally assigned to Sir Philip Francis. The author was a man thoroughly cognizant of British politics; a vehement opponent of the government, and a fiery pleader for popular liberty. The dominant message is sounded in these words from the first letter of the series: "The admission of a free people to the executive authority of government is no more than compliance with laws which they themselves have enacted." Much constitutional knowledge is shown in these trenchant attacks, which continually refer to the British Constitution as the bulwark of the people's rights. In manner, the letters are vigorous, bold, and among the finest specimens of impassioned invective and irony in English literature.

Junkers, yoong'kérz, a name given to the younger members of the nobility of Prussia and the adjoining states. "Junkerthum" was a term of reproach used in the 19th century to designate the party of reaction in Prussia, which found its most strenuous supporters among the nobility.

Junk'in, George, American Presbyterian clergyman: b. near Carlisle, Pa., 1790; d. 1868. He was graduated from Jefferson College (Pa.) in 1813 and entered the Presbyterian ministry in which he became prominent as a leader of the party known as Old School Presbyterians. He founded Lafayette College at Easton, Pa., in 1832, and was its president till 1841, returning thither in 1845, after three years spent as president of Miami College at Oxford, Ohio. In 1848 he became president of Washington College (now Washington and Lee). He was an outspoken upholder of slavery, but was opposed to secession, and on account of his Union sentiments resigned the presidency of the college in 1861. Consult: 'Life' by D. X. Junkin (1871).

Junks, large flat-bottomed vessels, from 100 to 150 tons burden, used by the Chinese. They have three masts, and a short bowsprit placed on the starboard bow. The masts are supported by two or three shrouds, which, at times, are all carried on the windward side. On the fore and main mast is a sort of lug-sail, of cane or bamboo.

Ju'no, the most exalted divinity of the Latin races in Italy next to Jupiter, of whom she was the sister and wife; the equivalent of the Greek Hera. She was the queen of heaven, and under the name of Regina (queen) was worshiped in Italy at an early period. She bore the same relation to women that Jupiter did to men. She was regarded as the special protectress of whatever was connected with marriage. She was also the guardian of the national finances, and a temple, which contained the mint, was erected to her under the name of Juno Moneta on the Capitoline.

Junot, Andoche, än-dōsh zhü-nō, DUKE OF ABRANTES, French marshal: b. Bussy-le-Grand 23 Oct. 1771; d. Montbard 22 July 1813. He was intended for the bar, but on the outbreak of the revolution joined a volunteer battalion,

JUNTA—JUPITER

and soon attracted notice. At the siege of Toulon, in 1793, he became secretary to Napoleon, and went with him into Italy and Egypt in the capacity of aide-de-camp. In Egypt he was advanced to the rank of general of brigade. In 1800 he was made commandant of Paris, and he particularly distinguished himself at the battle of Austerlitz in 1805. In 1807 he was sent with an army into Portugal, and made his entry without opposition into Lisbon, his success being rewarded with the title of Duke of Abrantes. On the arrival of the British he was defeated at Vimeira, and was then obliged to submit to the humiliating convention of Cintra. Although he subsequently took part in the campaigns (1809) against Austria, (1810) against Spain, and (1812) against Russia, he failed to retrieve his reputation. In 1813 he became insane, and lost his life by leaping from a window.

Junta, a high council of state; a term common in all Spanish-speaking countries. It was originally applied to an irregularly summoned assembly of the states, as distinguished from the cortes or parliament regularly called together by the authority of the king. In Cuba the term was adopted by the insurgents before the Spanish-American war, to designate the general legation of the Cuban republic abroad. This legation or junta was first appointed 19 Sept. 1895, by the Constituent Assembly that formed the insurgent Cuban government, which at the same time made T. Estrada Palma head of the junta and chief Cuban representative abroad, with authority to appoint ministers to all governments and to have control of Cuba's diplomatic relations and representatives throughout the world. The junta established its headquarters in New York, and was the organization through which the insurgents' friends outside of the island communicated with the Cuban soldiers in the field during the Spanish-American war. See CUBA.

Junto, *The*, a club formed in Philadelphia by Benjamin Franklin for mutual improvement. Morals, politics, and natural philosophy, as well as the social well-being of man, were the main subjects discussed. It continued for about 30 years. The name was also applied to an English Whig ministry in the reign of William III., the chief members of which were Admiral Russell, Somers, Lord Wharton, and Montague, the great financier. This was the first ministry ever made of one and the same party politics. It was the suggestion of Robert, earl of Sunderland, to William III., who shrewdly said, if all the ministers were of one party they would pull together.

Jupati, *joo'pä-té*, a palm (*Raphia taedigera*) of the tide-flooded lands of the lower Amazon and Pará rivers, remarkable for its leaves, probably the largest in the vegetable kingdom. The trunk is only 6 or 8 feet high, and 1 foot in diameter. The leaves rise nearly vertically from the trunk, bending out on every side in graceful curves, forming a magnificent plume 70 feet in height and 40 in diameter. Leaves have been measured 50 feet long, and the leaf-stalk is often 12 or 15 feet long below the first segments of the leaf, and 4 or 5 inches in diameter, perfectly straight and cylindrical, and when dried light and strong as the quill of a bird. The Indians split it into laths for a variety of purposes — window-

shutters, boxes, bird-cages, partitions, and even entire houses being constructed of it, with the addition of a few supporting posts at the angles. The fruit, a large oblong drupe, has a bitter oily flesh.

Jupiter, *joo'pl-tér*, or *Juppiter*, the supreme deity of the Latin races in ancient Italy, the same as the Greek Zeus. As the supreme deity Jupiter received from the Romans the title of *optimus maximus* (best greatest), and as the deity presiding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded rain, hail, and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured by clouds. Hence the epithets of *Pluvius* (rainy), *Tonans* (thundering), etc., were applied to him. The most celebrated of his temples was that on the Capitoline Hill dedicated to him as *Jupiter Optimus Maximus*, jointly with Juno and Minerva. He was represented with a sceptre as symbolical of his supreme authority. He was the guardian of all property; and every Roman was believed to be under his protection, and that of his consort Juno, the queen of heaven. White animals were offered up to him in sacrifice, his priests wore white caps, and his chariot was represented as drawn by four white horses. See JUNO.

Jupiter, the largest planet of the solar system, and the fifth (excluding the asteroids) in order of distance from the sun. Its mean diameter is about 85,000 miles; polar diameter about 82,000; its mean distance from the sun 475,692,000 miles; its period of revolution round it 11 years 10 $\frac{1}{3}$ months; its orbit is inclined to the ecliptic at the angle 1° 18' 40.3". The inclination of its axis is 3° 5' 30", so that changes in the seasons must be almost unknown; its volume is 1,400 times that of the earth, but its mass is only 300.857 times. Jupiter has five moons, the last was discovered by Barnard, at Lick Observatory in 1892. The other four were discovered by Galileo in 1610 and are visible through an ordinary telescope. They are at average distances of from 267,380 to 1,192,820 miles from the planet; they appear to make one revolution on their axis while passing once round the planet. Europa, the smallest, has a diameter of 2,099 miles, somewhat less than that of our moon; Ganymede, the largest, has a diameter of 3,436 miles. The planes of their orbits are nearly the same as the ecliptic and the orbit of Jupiter. The disk of Jupiter is crossed in a direction parallel with the equator by three or four vividly marked bands or belts; other of these belts vary in density and distinctness. Spots also appear and remain for some time on its surface. In particular, a large red spot of varying dimensions has been observed from time to time. Professor George Washington Hough sums up the results of his 23 years of observations of Jupiter somewhat as follows: First, its equatorial belt changes both in size and position slowly and gradually. Second, the fainter belts also vary. Third, the circular white spots are very permanent in latitude, but are not fixed in position one with another. Fourth, the dark spots of the same size as the circular white spots are not so stable as they, and probably lie at the level of the equatorial belt. Fifth,

JURA — JURISDICTION

the large, irregular white spots near the equator make one rotation in 9 hours 50 minutes. As to the constitution of the planet, Prof. Hough concludes that the matter at the visible boundary of Jupiter has a density about half that of water (the average density of the planet is 1.37 times that of water). The medium at the boundary is in the nature of a liquid. In it the great red spot and the circular white spots are located. In such a medium all motions would be slow and gradual and the shape and size of an object would be very permanent. The equatorial and polar belts may be located on the surface or at a higher level than the red spot. In middle latitudes within 20° of the equator the higher atmosphere carries a layer of dark matter. In this envelope are formed the openings that we call white spots, and by unequal distribution black spots. The belts may be assumed to be some sort of vapor of considerable density. The planet is at a high temperature, but not self-luminous.

Jura, joo'rā, a chain of mountains in central Europe, partly belonging to France, partly to Switzerland, between which they form a sort of natural barrier, extending from southwest to northeast, and exhibiting a number of parallel ridges. The greatest length is nearly 200 miles, from Belley in France, department of Ain, to the banks of the Rhine; and the greatest breadth about 60 miles, between the Lake of Geneva and the banks of the Doubs. The principal geological formation is the Jura limestone, with greensand, belonging to the lower cretaceous series. Stalactite caves are numerous. The two chief rivers having their source in the chain—the Ain and the Doubs—are both French. They descend from its western slopes, and belong to the basin of the Rhone. The highest peaks of the Jura are Crêt de la Niège, Reculet, Mont Tendre, and Dôle, all over 5,500 feet.

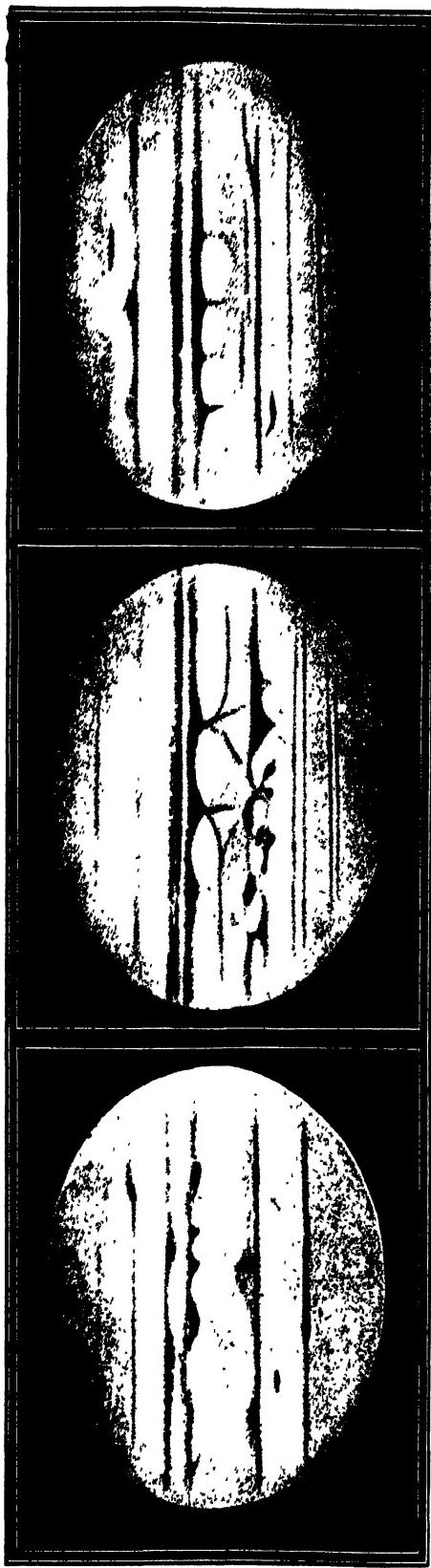
Juras'ic, a system or series of formations with like characteristics, and containing fossil remains indicating a time occupying the first half of the Mesozoic period, and characterized by many changes in the distribution of sea and land, especially in the northern hemisphere, where the present continental areas were apparently represented by archipelagoes. The formations of this period take their name from their prominent exposure in the Jura Mountains; but are known in Great Britain as the Oolites because there made up of granular (oolitic) limestones below the Cretaceous and above the Lias, from the latter of which the series is separated by no very definite boundary. In America synchronous formations are, indeed, called "Juratrias" and represent the transition from the Permian to the Cretaceous. The Jurassic is represented somewhat in South America and in the western United States, as in the highly fossiliferous "Como stage" beds of Wyoming, and the auriferous state of California, but most strikingly in the brown "bird-track" sandstones of the Connecticut Valley, in Nova Scotia, and in the red rocks that crop out along the eastern foot of the Alleghanies from New Jersey to South Carolina. During this period most of the globe now dry land was covered with shallow seas which were the abode of a great variety of

lowly fishes and reptiles. On land it was the height of the age of reptiles, and especially of dinosaurs (q.v.) and pterodactyls. Toward its close the progenitors of birds appeared in the shape of *Archæopteryx* (q.v.), and traces of mammals are found. Consult authorities mentioned under GEOLOGY.

Jurel, joo'rēl, or **Xurel**, a fish of the genus *Caranx*, especially *C. cryos*, more widely known as the yellow mackerel and hard tail. Unlike most members of this tropical genus, the jurel is common as far north as Cape Cod. In Florida and the Gulf States it is an important food-fish, caught in seines during the spring and summer when in shallow water for the purpose of spawning. It is migratory, and like most wandering fishes carnivorous and voracious.

Jurisdiction includes both the right to exercise authority (*imperium*) and the field within which such authority may properly be exercised (*dominium*), whether its limits be territorial or personal. In early law, jurisdiction in the second sense was rather personal than territorial, and the same must be true wherever distinct races occupy together the same territory. While the tendency is to gradually work out a system of law applicable to all inhabitants, the state must of necessity recognize the fact that its subjects of different races will consent to be governed only by separate and often contrasting systems. Such is the case, for example, in British India to-day. So, too, jurisdiction was divided according to the subject matter, and the Church secured and jealously maintained authority over all matters of conscience, and managed to extend the jurisdiction of the ecclesiastical courts to very important questions, including marriage, legitimacy, wills, and administrations, and to actions affecting the personal rights of the clergy.

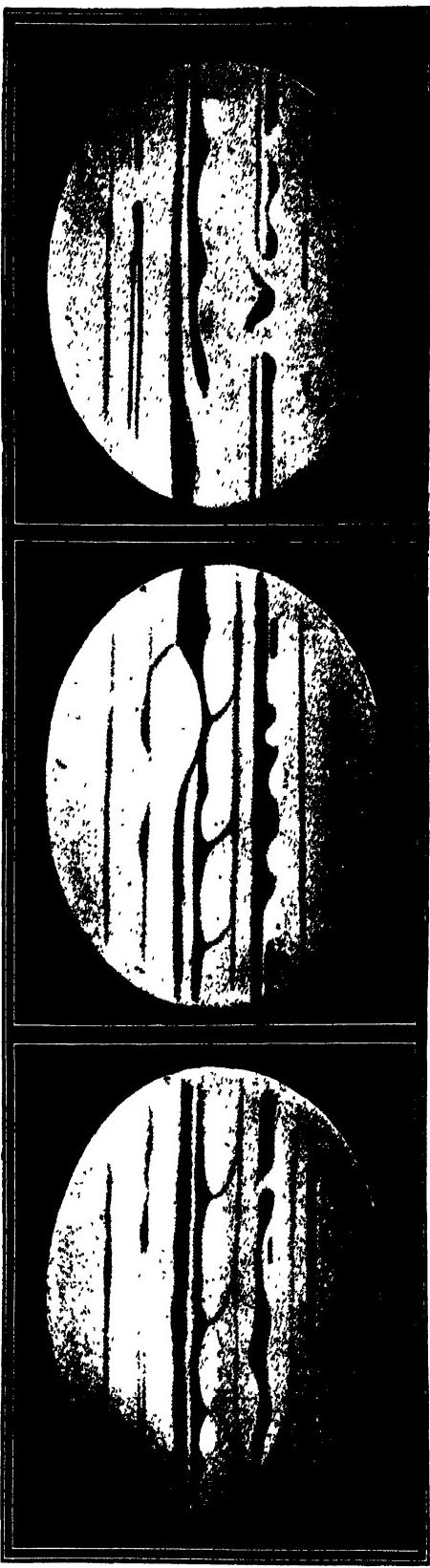
The Constitution of the United States discriminates clearly and sharply between the executive, the legislative, and the judicial powers of government, and its provision that the Constitution and the laws of the United States made in pursuance thereof shall be the supreme law of the land, taken in connection with the provision that the judicial power shall extend to all cases arising under the Constitution, forms the basis of a jurisdiction which, at least in the extent to which it has been carried, is without precedent outside of the United States. It is by virtue of these provisions that the Federal courts exercise the power of declaring void acts of Congress or of the State legislatures which conflict with the Constitution of the United States. To this power and the energy and ability of the Supreme Court in its exercise, are due the vigor and efficiency of the Federal government, and the establishment of its supremacy within the field of its jurisdiction. This feature has been imitated in the several State constitutions with results unquestionably beneficial as a whole, and so important that the courts have come to be spoken of as the guardians of the constitution. But one result not so fortunate is that the legislative branch of the government, though in theory as much bound by constitutional restrictions as though there were no authority to which an appeal against the validity of its enactments can be taken, is manifesting a disposition to disregard them altogether, leaving the whole question of con-



1896, MARCH, 24d. 6h. 30m. G.M.T.

1897, MARCH 11, 9h. 11m. 55m. G.M.T.

1898, APRIL, 4d. 9h. 55m. G.M.T.



1899, APRIL, 15d. 12h. 10m. G.M.T.

1900, APRIL, 20d. 14h. 15m. G.M.T.

1902, JUNE, 26d. 14h. 31m. G.M.T.

CHANGES IN THE ASPECT OF THE PLANET JUPITER OBSERVED AT VARIOUS TIMES.

JURISPRUDENCE — JURY

stitutionality to the courts. As our system of government provides no method by which the question can be raised, except in the course of a litigation in which one party relies upon the right conferred by such a statute, there are possibly many unconstitutional acts in force in the various States. A more important consideration is that a disposition on the part of the judiciary to interfere with matters properly legislative may thus be created, and lead to forced constructions by which any law which the judges believe to be bad is held obnoxious to the constitution — resulting in illogical and inconsistent decisions, and a weakening of the authority of the courts.

The Constitution provides that the judicial power of the United States shall extend to controversies "between citizens of different States." The purpose was to open the way for legislation which would provide a tribunal in which the right of a citizen of any State to pursue his legal remedies could not be denied; probably, too, to afford him a tribunal less likely to be affected by local prejudice than a State tribunal of first instance, probably a county court. It is not contended that anything further was designed, but upon this clause depends the most extensive and, except for the provision as to constitutional interpretation which we have just considered, the most important, body of Federal decisions. The tendency of the Supreme Court was at first to hold that the Federal court should administer the law of the State in which it was sitting and that while a citizen of Pennsylvania, for example, having a claim against a citizen of New York, might, if he saw fit, bring his action in the Federal, rather than in the State, court — the law to be applied would be the law of the State of New York. But this rule has been departed from in the later decisions, and while the Federal courts still hold themselves bound to follow the interpretation put upon State statutes by the State courts (unless, of course such statutes are attacked as in conflict with the Constitution of the United States), they hold themselves free to disregard the interpretation of the common law by the State courts, and the system of law built up within the State by the adjudications of its courts, and to adopt their own interpretation, and follow their own judgment. That the Federal courts are popular is shown by the fact that the most important litigation, estimated on the basis of the amount at stake is, where possible, usually brought before them, notably proceedings against corporations and especially the foreclosure of corporation mortgages where it is quite common for the trustee for the bondholders to be a corporation or individual of an other State, or where a committee of bondholders, or even a single bondholder, residing outside the State which is the domicile of the debtor corporation, is the plaintiff. This is sufficient to give jurisdiction to the Federal court.

We have therefore a most interesting condition of concurrent jurisdictions applying to every inhabitant of the United States. The Federal courts are courts of limited jurisdiction — limited to authority expressly conferred by the Constitution and laws of the United States, but once jurisdiction is established, unlimited in the scope of its exercise. Congress has prescribed that the jurisdiction shall only exist when the

matter in controversy has a pecuniary value exceeding \$2,000, and that actions shall be brought only in the district within which the plaintiff or the defendant resides, and has made provision for the removal from the State courts of causes which might originally have been brought in the Federal courts. Some of the States have attempted to prevent this increasing jurisdiction of the Federal courts; for example, by the passage of acts providing as a condition of a license to a foreign corporation to do business within the State, that such corporation, if sued, would not remove the cause into the Federal court. Such acts are manifestly unconstitutional, and have been so declared.

JOHN DOUGLASS BROWN,
Philadelphia.

Jurisprudence. See LAW.

Jury, twelve impartial men legally competent to act, who, under the sanction of their oaths, determine by their unanimous verdict the innocence or guilt of the accused in a criminal trial, or decide the issues of fact which are contested between plaintiff and defendant in a civil trial.

The jury is the characteristic feature of English or Common law, distinguishing it from the systems of Continental Europe derived from the law of the Roman Empire. It is peculiar in itself and incidentally it has produced characteristic developments of our law not found in the Roman or Civil law systems, of which perhaps the most noteworthy is our law of Evidence. The history of the jury system has been most thoroughly and ably investigated, especially in recent years.

Its function has completely changed. Originally those persons from the vicinity who had knowledge of the subject matter were summoned to court to state, upon their solemn oaths, what the common opinion of the neighborhood was as to those facts which formed the basis of the criminal charge to be tried, or the basis of the right to possession or enjoyment of land which was at issue, which were the typical cases of early days. It seems to have been soon established that 12 substantial men were a sufficient number to determine this question. As the judicial system developed, courts came to have more extended territorial jurisdiction, and litigation grew more extensive. Attendance of 12 persons acquainted with the facts of each cause to be tried would impose an intolerable burden upon the community, and our forefathers worked out the plan of submitting their legal controversies to the decision of an impartial jury sworn to determine the facts in issue upon testimony given under oath by witnesses summoned by the parties.

Students of English and American history would probably unanimously agree that as a part of our system of civil government the jury has been a valuable institution. There can be no doubt of its educational value, and of its importance in making each freholder who served on a jury feel that he was individually performing an important public duty. Juries played a conspicuous part in defense of popular rights against attempts at tyrannical exercise of authority by the executive government. In the libel cases of the 18th century the contest was bitterly fought, the judges, under the lead of Lord Mansfield, maintaining that whether a document

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was libellous or not libellous was a question of law for the court (that is, for the judge) to determine, the jury being limited to finding affirmatively or negatively the fact of publication; while the juries, on the other hand, contended for their right to find general verdicts ("guilty" or "not guilty"). The contest was settled by Fox's Libel Act in favor of the right of the jury to determine the guilt or innocence of the accused.

Students of law differ as to the merits of the jury system. Arguments drawn from the supposed mental inferiority of juries need not be considered, since this is not an inherent defect, and there is no more reason why a community should have inferior jurymen than inferior officials of any other class. But weighty objections of an essential character have been suggested. The chief is as to the requirement of an unanimous verdict, which, it is argued, must constantly produce a disagreement and failure to reach a conclusion, or the sacrifice of opinions conscientiously held by some of the jurors. There is no doubt that this requirement is an essential feature of the jury system as known to English law; it has been expressly so decided by the Supreme Court of the United States which, in interpreting the clause of the Federal Constitution which provides that in civil suits in the Federal courts "the right of trial by jury shall be preserved," has held that this requires the unanimous verdict of 12 men. A small number of the States have modified the system by providing for juries of less than 12, or of verdicts rendered by a vote less than unanimous. When such legislation is not in conflict with the State constitution it is lawful, as is doubtless the provision authorizing the service of women on juries.

Another objection is the doubt as to whether the jury is the best means of arriving at determinations of fact. This controversy has been bitterly fought, one side maintaining that the jury is not fitted, either by training or capacity, to decide fairly and intelligently doubtful questions of fact, and that one of its most important functions, that of assessing damages, is not properly performed, especially where the requirement of unanimity necessarily leads to compromise verdicts. On the other hand it is argued that the jury, if properly drawn, represents the average intelligence of the community, and that when it does so, no fairer tribunal can be discovered, and not, perhaps, very consistently, that in civil matters control of the case is really in the judge, who by careful instructions can usually so direct the jury as to bring about an intelligent verdict, or, as a last resort, can set aside one which is clearly wrong, and award a new trial.

A verdict of acquittal in a criminal proceeding finally disposes of the charge against the defendant both by the common law and, in this country, by the provisions of the Federal Constitution (and of most, if not all, of the State constitutions) that no person shall "be subject for the same offense to be twice put in jeopardy of life or limb." Doubtless from this arose the doctrine that in criminal cases the jury are judges both of law and fact, which caught the popular fancy, is not without the weight of respectable judicial authority to sustain it, from the time of Junius, who upheld it in opposition to Lord Mansfield, has been a favorite doctrine of popular leaders, and only in recent years may

be regarded as finally disposed of. The doctrine was discussed by Chief Justice Mitchell, of Pennsylvania, in a capital case in 1801, and pronounced by him to be "unsound in every point of view, historical, logical, or technical," and in 1805 the Supreme Court of the United States (speaking by Mr. Justice Harlan) reached the same conclusion and held that in the courts of the United States it is the duty of the jury in criminal cases to receive the law from the court, and to apply it as given by the court, subject to the condition that by a general verdict a jury of necessity determines both law and fact as compounded in the issue submitted to them in the particular case. Mr. Justice Gray filed a long and able dissenting opinion concurred in by Mr. Justice Shiras, and in this case, reported in 156 United States Reports (page 51), all the arguments on both sides can be found.

The grand jury is, historically, a sort of representative committee of the people of the district throughout which the jurisdiction of the court extends, charged with the duty of reporting to the court offenses which have been committed which they consider should be inquired into, and persons whom they believe to have committed criminal acts for which they should be punished. Its development into the modern grand jury is not well understood. The highest authorities on our early legal history say of it, "The details of this process will never be known until large piles of records have been systematically perused. This task we must leave for the historian of the 14th century."

The grand jury as an existing institution consists of a number of persons drawn from the same class as the ordinary or petit jurors. At the common law the number summoned was 23. They are sworn to the faithful discharge of their duties, and the court then delivers a charge to them, calling their attention to the duties they are to perform, either generally or with reference to any matters of special public interest falling within their jurisdiction to which the court thinks proper to direct their attention, and they can then proceed to business. All indictments are submitted to them and, according as they determine, after hearing the prosecutor's evidence, whether they are well founded or not, they indorse them "true bill" or "ignoramus" (or equivalent words). In the former case the accused is held for trial, in the latter discharged. It is the custom for them to make report to the court on such matters as seem to them of public interest and importance, and to make such recommendations as seem good to them. The report made by them of any offense from their own knowledge or observation, without a bill of indictment laid before them, is called a Presentment.

For the history of the origin and development of the jury, consult: Pollock and Maitland, "History of English Law"; Thayer, "Preliminary Treatise on Evidence at the Common Law" (chapters ii.-iv.); Stephen, "Commentaries on the Laws of England" (Bk. V., ch. xiv.); Stubbs, "Constitutional History of England"; Cooley, "Constitutional Limitations." For a discussion of the merits of the institution under modern conditions which is generally accepted as full and impartial, consult "The System of Trial by Jury," by the late Mr. Justice Samuel F. Miller (21 Amer. Law Review, 859). For the origin of the grand jury: Pollock and

JUSSERAND — JUSTIN

Maitland, 'History of English Law' (Bk. II., ch. ix., § 4). JOHN DOUGLASS BROWN,
Attorney at Law, Philadelphia.

Jusserand, Jean Adrien Antoine Jules, zhōn à drē àn àn-twān zhū zhū-sé-rān, French diplomat and author: b. Lyons 18 Feb. 1855. He was educated at the Faculté de Lyon, in 1878 entered the French ministry of foreign affairs as consul at London; subsequently held other posts in the ministry, among them that of chief of the bureau of Tunisian affairs, and that of associate sub-director of the protectorate; in 1887-90 was councillor of the French embassy in London. In 1890 he became minister to Denmark, and in 1902 ambassador to the United States. His best known work is his 'Les Anglais au Moyen Age: La Vie Nomade et les Routes d'Angleterre au 14me Siècle' (1884; trans. by Smith as 'English Wayfaring Life in the Middle Ages' 1892), which was crowned by the Académie. Of his further writings, the following have appeared in English: 'The English Novel in the Time of Shakespeare' (1890); 'A French Ambassador at the Court of Charles II.' (1892); 'Piers Plowman' (1894); 'English Essays from a French Pen' (1895); 'A Literary History of the English People' vol. I. (1895); 'Shakespeare in France under the Ancient Régime' (1899).

Justice, Department of, in the United States, an executive branch of the government. The department dates only from 1870. The supreme head of this department, the attorney-general, is appointed by the President and confirmed by the Senate. He is a member of the cabinet, and his salary is \$8,000 a year. The establishment of this department brought under his control all United States district attorneys and marshals, and secured uniformity in the trial and prosecution of cases. The attorney-general rarely argues cases, this work being done by his subordinates. The solicitor-general takes the place of the attorney-general in the latter's absence. He has charge of the conduct of cases in the courts at Washington. The office of attorney-general was established almost at the beginning of the government, and not until 1870, as stated, was the Department of Justice organized and placed under his charge. See ATTORNEY-GENERAL.

Justice, Lord, a person invested with royal authority in England for a short time, during the absence of the monarch. Queen Victoria and her successor Edward VII. have never appointed lord justices in their absence; George IV. was the last king of England to do so. The powers of lord justices have been confined to pardoning or reprieving convicts, summoning or proroguing parliament, disposing of treasury funds, and making church preferments. In the absence of the viceroy from Ireland lord justices have sometimes been appointed to perform his functions.

Justice of the Peace. See COURT.

Justifica'tion, theologically, the rendering a man just, or the imputing to him of righteousness. The Roman Catholic doctrine of justification was formulated by the Council of Trent in 1547. According to the Council the first step in justification is the calling of the sinner to repentance through the working in his heart of

divine grace, and the assistance of his will, whereby he is enabled to turn to God. This grace is based on no merit in the sinner, but arises entirely from God's love and mercy. "This disposition or preparation," the decree continues, "is followed by justification itself, which justification consists, not in the mere remission of sins, but in the sanctification and renewal of the inner man by the voluntary reception of God's grace and gifts, whence a man becomes just instead of unjust." The Lutherans regard the preliminary operation of divine grace as not due to any merit in the sinner, but they rejected the view that man could contribute anything toward his own conversion. According to the Augsburg Confession men "are justified freely for Christ's sake through faith," and "this faith doth God impute for righteousness before him"; and Calvin declares justification to consist "in the remission of sins and the imputation of the righteousness of Christ." Thus, according to these theologians justification denotes not a rendering just, but a reputing and declaring just. The Roman Catholics believe that justification consists essentially in a process of sanctification and renewal of the moral nature in which the will of the sinner operates toward his own salvation. Luther and Calvin conceived that the merits of Christ were imputed to the believer, though they also taught that sanctification necessarily followed on real justification, of which it is the only external proof. Their doctrine is based mainly on the Epistle to the Romans (see especially iii. 28 and iv. 5). The Roman Catholic view of justification is based on such passages as Luke xviii. 14; 1 Cor. vi. 11; James ii. 24. The Church of England and Protestant Episcopal Church in the United States define justification in their XI. article as follows: "We are accounted righteous before God, only for the merit of our Lord and Saviour Jesus Christ by faith, and not for own works or deserving: Wherefore, that we are justified by faith only is a most wholesome doctrine, and very full of comfort."

Jus'tin I., Byzantine emperor: b. 450; d. 1 Aug. 527. He was a peasant of Dacia and rose from the rank of a common soldier to be commander of the imperial guard, and on the death of Anastasius I. in 518 became emperor. He relegated the civil administration to the quæstor Proclus, and between them the empire was governed with a fair amount of success. Consult Bury, 'Later Roman Empire' (1889).

Justin II., Byzantine emperor: d. 5 Aug. 578. He succeeded his uncle Justinian I. in 565. Beset with enemies outside the empire and harassed with internal discord, he in 574 solved his difficulties by abdicating in favor of Tiberius, captain of the guard. During his reign northern Italy was conquered by the Lombards, and the Persians took possession of several Asiatic provinces of the empire.

Justin (MARCUS JUSTINIANUS JUSTINUS), a Latin historian, who probably lived at Rome in the 2d or 3d century A.D. He made an epitome of the general history of antiquity by Trogus Pompeius, a native of Gaul, who lived in the time of Augustus, and whose work is no longer extant. This epitome, although incorrect in detail, is valuable for its compressed reproduction of the old histories. The first English version, by Goldingé, appeared in 1574.

JUSTIN MARTYR—JUTE

Justin Martyr (JUSTINUS MARTYR), a Christian apologist and martyr: b. Flavia Neapolis, Shechem, Palestine, 100 A.D.; d. Rome 165. He began active life as a professor of Platonic philosophy, and subsequently embraced Christianity without abandoning Platonism. He was a staunch adherent of the Christian party in the empire, a keen confuter of Gnosticism, and an unwearied defender of the Christian doctrine of the Logos. In every department of Christian dogmas he stood foremost as a teacher. Eventually he went to Rome (150 A.D.) and during ten years of activity he wrote his 'Apology,' with a supplement known as the 'Second Apology,' addressed to the Emperor Marcus Aurelius. He afterward had a controversy with a Jew, an account of which is embodied in his 'Dialogue with Trypho the Jew.' He was put to death for his faith, and his day on the Church calendar is 31 April. Consult: Migne, 'Patrologia'; Semisch, 'Justinus der Märtyrer'; Aubé, 'Justin, Philosophe et Martyr' (1874).

Justinian I. (FLAVIUS ANICIUS JUSTINIANUS), surnamed the GREAT, emperor of the East: b. of Gothic peasant parentage at Tauresium, Illyricum, probably 11 May 483 A.D.; d. 14 Nov. 565. Patronized by his uncle, Justin I., who, from a Thracian peasant, had become emperor, he so flattered the senate and dazzled the people that he was made consul, and took the title of *Nobilissimus*. On the death of his uncle, with whom he had latterly shared the imperial power, he was proclaimed emperor, and married an actress named Theodora. During his reign the party disputes of the Greens and the Blues became so violent, that in his attempt to quell the tumults the emperor's own life was in jeopardy, and a great part of Constantinople was destroyed by fire. Aided by his generals, he was able subsequently to restore to the Roman empire a part of its former possessions, as when Belisarius in 523 and 529 defeated the Persians, and achieved victories in Africa, and when Narses put an end to the Ostrogoth rule in Italy. Turning his attention to the laws, Justinian commissioned ten learned civilians to draw up a new code, and the result was the 'Corpus Juris Civilis,' or body of civil law. He took great interest in building cities, fortifications, and churches; among the latter he rebuilt the church of St. Sophia at Constantinople. To maintain his public munificence he oppressed the people with taxes. Consult Finlay 'History of Greece' (1880); Hodgkin, 'Italy and her Invaders,' Vol. IV. (1880); Bury, 'Later Roman Empire' (1889); Hutton, 'The Church in the Sixth Century' (1897); Gibbon, 'Decline and Fall of the Roman Empire' (ed. by Bury 1896-1900).

Justinian II., surnamed RHINOTMETUS, Byzantine emperor: b. 669; d. December 711. He succeeded his father, Constantine IV., in 685, and was deposed and banished for his cruelty, by his general, Leontius in 695. He regained his throne ten years afterward, and was overthrown by Philippicus Bardens and killed.

Jute. Two species of plants yield the jute of commerce, *Cochchorus capsularis* and *C. olitorius*. They are tall shrubs, 8 to 15 feet high, the fibre being produced in the bark, and known as bast fibre. Supposed to be indigenous to India, where the species grows wild, cultivated to a limited extent by other Eastern people, as

the Chinese and Malays, *C. olitorius* is naturalized in all parts of the tropics to the shores of the Mediterranean. Jute was introduced into the United States by the Department of Agriculture in 1870 (see various articles in Monthly Reports of this department 1870-5), and was found to be adapted to cultivation along the line of Gulf States from Texas to South Carolina. It should be noted that the China jute of commerce is not jute at all, but a similar bast fibre derived from *Abutilon avicinæ*. This plant was experimented with in New Jersey 25 years ago, though unsuccessfully, the fibre being wrongly called American jute. In India many kinds of jute are recognized, all being known under local trade names, which are unimportant here. The value of jute as a textile lies wholly in its fineness, silkiness and adaptability to spinning, low cost of the raw material being another advantage. Several American fibre plants classed as weeds yield a better, whiter, and stronger fibre, though they cannot be utilized for economic reasons. (See special report on bast fibres, No. 6, Office of Fibre Investigations of the Department of Agriculture.) The fibre of jute, compared with other textiles, is quite inferior, the bleached filasse soon losing its whiteness and becoming a dingy, dirty brown, while its strength rapidly deteriorates. Nevertheless it may be regarded as one of our most useful fibres — too useful in certain directions, as its fineness and lustre, as well as cheapness, adapt it most readily to purposes of adulteration, and as it takes colors easily it can be stained or dyed to imitate many of the other fibres, though such frauds can be readily detected. The uses of the fibre are many, and it enters into all classes of textiles from woven fabrics of great beauty to coarse ropes and bagging. In the manufacture of fabrics it goes into curtains, chair coverings, and other forms of upholstery, carpets, webbing, burlap and bagging (especially cotton bagging), and it has been employed for imitation silk fabrics, although for this purpose the fibre requires a special treatment in order to subdivide it more finely and render it more glossy. The fibre is also made into all kinds of cordage, either honestly, as jute, or as an adulterant, considerable quantities having been used in past time for the manufacture of binding twine. It is largely employed for fine and coarse twines, small rope, sash cords, etc., and where cheapness is a desideration it fills the demand. During the fiscal year ending 30 June 1902 we consumed 131,192 tons of jute and jute butts, costing \$4,480,000. The jute was worth \$48, and the jute butts \$24 per ton. The commercial use of jute dates back less than a century, the first exports in noticeable quantity (about 18 tons) having been made, to England, in 1828. By 1850 the exports had reached 30,000 tons; in 1871, 310,000 tons. Now some 800,000 acres are cultivated in jute, more than half of this area comprising nine districts of northern Bengal. Both high and low lands are employed for this culture, although the larger part of the crop is produced upon the "churs" or lands of recent alluvial formation along the rivers. In this country the "river bottoms" would be favorable for the culture, in localities of the South, where the requisite conditions of heat and moisture prevail.

Twelve to fifteen pounds of seed is the average quantity sown per acre, though Spon gives nearly double this amount. In India the yield is

JUTIAPA — JUXON

about 400 pounds of fibre per acre. Little or no cultivation is given the crop save thinning out where overcrowded. The plants mature in three months and the crop is harvested with a bill hook or sickle at the time when the flowers have begun to show and the seed has not yet appeared. If the plants are allowed to seed, the fibre will be stronger and heavier, but harsher. In some districts, after harvesting the stalks are stacked in the field until the leaves drop off, while in other localities stacking is not practised. The stalks are sorted as to length into three sizes, and made into bundles that one man can carry. The extraction of the fibre is accomplished by steeping the bundles in stagnant water, covering them with jungle plants, clods of earth or cow dung. When the setting is completed the ryots go into the water waist deep, and by thrashing the surface of the water with the stalks, assisting the loosening of the bark with the fingers, the fibre is separated from the wood. Afterward it is wrung out and hung upon lines to dry. Little may be said regarding jute culture in this country. Machinery would need to be used for stripping the fibre, and there are no practical machines; furthermore at the low prices which prevail for the imported jute, it is doubtful if it could be made a paying crop. The plant is adapted to cultivation in the United States and produces a superb fibre, but it would not be able to compete with India jute at $1\frac{1}{2}$ to $2\frac{1}{2}$ cents per pound. See Special Report (No. 8) office of Fibre Investigations of the Department of Agriculture; 'Dictionary of the Economic Products of India' and various Bulletins of the Royal Gardens, Kew, England. See CORDAGE; CORDAGE INDUSTRIES; FIBRE; INDIA.

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Jutiapa, hoo-te-á-pá, Guatemala, a department bounded on the north by Jalapa and Chiquimula; on the south by the Pacific Ocean; on the southeast by Salvador; on the west by Santa Rosa. It has an area of 1,563 square miles. The principal industries of the department are cattle-raising and the cultivation of coffee. Sugar, tobacco, and fruits are also grown. Capital, Jutiapa. Pop. about 50,000.

Jut'land, the peninsular portion of Denmark (q.v.).

Juvenal, joo've-nál (DECIMUS JUNIUS JUVENALIS), Latin satirical poet: b. Aquinum, Volscian territory, 50 A.D.; d. 130 A.D. He was the son of a prosperous freedman, and studied rhetoric at Rome, where he took pupils in his professional studies. He is traditionally said to have been despatched with a military command to some remote province, Britain or Egypt, for satirizing Paris, an actor who was Domitian's favorite. His works consist of 16 satires, highly rhetorical, and full of life and fire. There is reason to think, however, that in describing Roman society, he, like Tacitus, has exaggerated the real condition of things. He writes like a scolding schoolmaster with the special pleading of a bitterly disappointed man, railing against classes and circles from which most probably he was excluded. He takes up one after another the common topics of the moral enthusiast, the power of wealth to do wrong, the corruption of senators, the vices of

women, the contempt under which poverty and simplicity are crushed, and the utter vanity of mundane things. Where Horace smiles with a good-natured sally of wit, Juvenal foams and shrieks, but his invective is skilful, epigrammatic and launched with all the point and power of a professional rhetorician. Gifford has translated these satires with remarkable skill, and Samuel Johnson made his first hit as a literary man by his imitation of the third and tenth, which he published under the titles 'London' and the 'Vanity of Human Wishes' respectively. Consult: Jahn, 'Juvenalis' (1850); and the notable English commentary of F. E. B. Mayor (1889).

Juvenile Offenders. In the United States the law with regard to juvenile offenders varies in the different States. The number of reform schools reported in 1900 was 82; instructors employed, 578; pupils attending school, 22,692, and 14,673 in industrial departments. The total number of inmates was 24,925. The value of grounds and buildings was \$18,873,587. The expenditures on buildings and grounds amounted to \$605,010; for salaries and other expenses, \$2,800,281, making a total expenditure of \$3,405,291. The number of assistants, not including instructors in school departments, was 1,788. There were 16,609 white inmates and 2,784 colored inmates; 8,514 were of native parents, and 4,122 of foreign-born parents. Those that could only read when admitted were 2,207, and 1,595 could neither read nor write. The number committed to the institutions during the year was 11,676, and the number discharged 11,990. When discharged from the schools many of the pupils possessed a trade and were provided with good homes; all could read and write; the majority had received the equivalent of a common school education.

In Great Britain, in the eye of the law persons are considered capable of committing crime at the age of 7, and are punishable like other persons. But in England and Ireland, whenever a person under the age of 16 is convicted and sentenced to be imprisoned, the court or magistrates may also sentence him to be sent to a reformatory school for not less than two or more than five years. Such sentence, however, cannot be passed on an offender under 10 years of age, unless his offense is by law punishable with penal servitude or imprisonment, or unless the sentence come from a superior court, such as a court of assize or of quarter sessions. Children who have not yet committed crime, but are in a vagrant and neglected state, may also be sent to an industrial school.

Jux'on, William, English prelate, archbishop of Canterbury: b. Chichester, Sussex, 1582; d. London 4 June 1663. He was educated at Oxford, took orders and after holding church livings (in 1609 at Oxford, and then in 1614 at Somerton), in 1621 succeeded Laud as president of St. John's College. In 1627 he was appointed vice-chancellor of the university, and about the same time chaplain in ordinary to Charles I., who gave him the deanery of Worcester, and then the bishopric of London (1633). He attended the king on the scaffold. His fidelity cost him his bishopric, but at the Restoration he was made archbishop of Canterbury.

K

K the eleventh letter in the English and other alphabets of the modern languages of western Europe.

The character is derived, through the Greek, from the alphabet of the early Phœnicians, where its form is that of K reversed, γ. The k represents the sound produced when the back of the tongue is brought into contact with the palate and the breath expelled. The sound-value of k is the same in all languages; but k is not employed in the modern Latin languages save in spelling foreign words or names. Nor does it occur in Latin save as an abbreviation (K or Kal.) for Kalendæ, K for the name Cæso, or for Cartago, etc.

In English the c of the Latin orthography of words from the Greek is always retained, even when it represents the sound of k, for example, sceptic, pronounced skeptic; and we are beginning to pronounce ceramic keramic. We even substitute c for k in Greek words and names, though in reading Greek we give to the k always its hard guttural sound: hence for us Alkibiades is (in sound) alsibiades, and even Kimon is simon.

The k in Greek names suffers a similar change in the modern Latin languages; but in German speech the true k sound in such names is retained: Ankyra, not ansyra, Korkyra, not corsyra; Kephalos, not sephalos.

In Anglo-Saxon and in Gaelic the k is always represented by c.

The guttural sound of k seems to have stood unchanged in ancient Greek and Latin, whether represented by that letter or by c; but in the modern languages derived from the Latin the k sound underwent great changes, becoming a sibilant equal to s, as "sezar" for Cæsar, or being "palatalized" into the sound tsh, for example, Gr. kyriake, Ger. kirche, Scotch kirk, Eng. church; to produce this change the middle of the tongue, instead of the back of it, is brought into contact with the palate; in French pronunciation the k-sound of c in Latin words, as camera, carbo, carnalis, is changed to sh, and the words are written chambre, charbon, charnel.

Kaaba, kā'bā, or kā'ā-bā. See CAABA.

Kabbala, kāb'ā-lā. See CABALA.

Kabul, kā-boot', or **Cabool**, Afghanistan, capital of the country and of the province of Kabul, situated at the west extremity of a spacious plain, in an angle formed by the approach of two ranges of hills, and (with the exception of a suburb) on the right bank of the Kabul River, which is spanned, in or near the city, by several bridges. It stands at the height of about 6,000 feet above the sea-level, and has a delightful climate in summer, but the winter is severe. The houses are in general slightly built of mud

and unburnt bricks, and there are no public buildings of any importance, though many of the mosques are spacious and commodious. There are hardly any proper streets in the city except those formed by the bazaars, which are extensive and well supplied with goods. A portion of one of the bazaars consists of four handsome covered arcades, separated by open squares and adorned with paintings. Kabul is now becoming an important centre of trade with India and central Asia, and its population is greatly increased in the summer season by the influx of traders and others. The improvements of Western civilization have recently been introduced in new industries and public utilities. The citadel of Kabul is the Bala Hissar or Upper Fort, situated on a spur of the adjacent hills. In it the Amirs used to reside, but the present Amir has his residence in the city itself. Estimated pop. 75,000.

Kabul River, a river of northeastern Afghanistan, rising in a spur of the Indian Caucasus, at a height of 8,400 feet above the sea-level. It flows for about 270 miles in an easterly course, breaking through the Khyber Mountains, crosses the district of Peshawar in British India, and enters the Indus at Attock in the Punjab.

Kabyles, kā-bilz'. See BERBERS.

Kadi, kā'dī or kā'dī. See CADI.

Kadiak, kād-yāk', an island of Alaska, situated southeast of the peninsula of that Territory. It is about 100 miles long and 60 miles wide, has a rocky mountainous surface, and an irregular, deeply indented coast, with some good harbors. Near the coast the soil is somewhat fertile, but little of it is profitable for agricultural purposes. The interior is mostly covered with low forests of pine and other trees. Bears and foxes are common, but other fur-bearing animals have become comparatively rare. The salmon-fisheries afford the inhabitants their chief occupation. Pop. about 2,000.

Kadiak Bears. See BEARS.

Kaffa, kaf'fa. See FEODOSIA.

Kaffraria, kāf-frā'riā, the country of the Kafirs in South Africa; a name formerly used by the Portuguese for all the African continent south from Sofala. It has gone almost out of use, its general substitute being the Transkeian Territories, forming part of Cape Colony.

Kafir-bread, kāf'er-brēd, the edible spongy pith of the stems and cones of any of several species of cycads (q.v.) growing in South Africa, especially *Encephalartos caffer*. This substance resembles sago in its farinaceous character.

KAFIR-CORN — KAI-FUNG

Kafir-corn, Indian millet (*Sorghum vulgare*) extensively cultivated by the half-civilized negroes of south-central Africa. It is called kao-hang by the Chinese. See GRASSES; MILLET.

Kafiristan, kā-fē-ris-tān' (Persian, "land of the infidels"), a region of central Asia northeast of Afghanistan, on the south slope of the Hindu Kush, and having as its southern boundary the Kabul River. Formerly the name was vaguely given to a much greater territory; it is now restricted to a country with an area of about 5,000 square miles, nominally under the government of the Amir of Afghanistan, but virtually belonging to an independent people. In the northern portion, which is mountainous, the surface is rugged and broken; in the south the land is mostly level or moderately undulating. Much of the soil has a high degree of fertility, and is adapted, especially in the valleys, to the cultivation of fruits and cereals of various kinds. Grapes are largely produced, from which is made an excellent wine. The number of the inhabitants is estimated at 200,000. They are said to be skilful workers in wood and metals, but their main pursuits are agricultural and those pertaining to the herding of cattle, sheep, and goats. In many of their traits—in features, complexion, beliefs, manners, and customs—they differ much from neighboring tribes, appearing to be of Aryan extraction, and they claim descent from soldiers of Alexander the Great. They are not without dissensions in the various tribal divisions in which they exist, but their isolation in a region of natural strength has enabled them to maintain a kind of political unity despite internal discords, as well as to preserve their independence against the invasions of other tribes. They have no literature, and in their language appear mingled traits of the Indo-Iranian dialects in their Iranian and Indian divisions. In religion they have largely withheld Mohammedan influences and preserved many of their tribal forms. Consult: Biddulph, 'Tribes of the Hindu Kush' (1880); Leitner, 'Kafiristan' (1881); McNair, 'A Visit to Kafiristan' (Proc. Royal Geog. Soc. 1884); Robertson, 'Kafirs of the Hindu Kush' (1890).

Kafirs, kaférz, **Kaffirs**, **Kaffres**, or **Caffres** (from Arabic *Kāfir*, infidel or unbeliever), the principal race inhabiting southeastern Africa, a branch of the great Bantu family. The name is now chiefly restricted to the tribes occupying the coast districts between Cape Colony and Delagoa Bay. They differ from the negroes in the shape of the head, it being more like that of Europeans; in the high nose, frizzled hair, and brown complexion, which becomes lighter in shade in the tribes of the more southern districts. They are a tall, muscular race, the average height being from 5 feet 9 inches to 5 feet 11 inches, and frugal and simple in their habits. Their chief occupation is raising and tending cattle, and hunting; garden and field work is mainly performed by women. They are of a peaceful disposition, but in times of war they display considerable bravery, tactical skill, and dexterity in the handling of their assagais or spears, shields, and clubs, as has been shown in their engagements with the British forces. There are several distinct branches or families of Kafirs, but the tribes which recent events have specially brought to the front are the Pondoos, the Fingoes, the Zulus, and the Swazi.

Kafirs, especially of the Zulu tribe, are distributed in large numbers over Natal and Cape Colony, and have become to some extent civilized. Frequent hostilities have taken place between the British and one or other of the Kafir tribes, beginning almost with the first acquisition by Britain of the Cape Colony.

Kagoshima, Japan, a city in the island of Kiushiu, capital of Satsuma province, and of the prefectural ken of the same name, on the northwest shore of Kagoshima Bay. The town is well built and is an important industrial centre with a considerable export trade. The celebrated Satsuma porcelain is manufactured in suburban Tanoura. Kagoshima was the feudal seat of the powerful Shimadzu daimios, and in 1863 was bombarded and destroyed by the British owing to the murder of an Englishman; the reigning daimio refusing satisfaction. Here in 1877 Saigo (q.v.) set up the standard of rebellion, and here also he was overwhelmingly defeated a few months later. Pop. (1898) 53,481.

Kagu, kā'gōo, the native name of the remarkable bird (*Rhinochetus jubatus*) peculiar to New Caledonia, where it was discovered only in 1860, and is now rapidly disappearing. It is the only species of a distinct family most nearly related to the sun-bitterns. The kagu is about the size of a domestic fowl, with short wings, rather long legs, a ralliform beak, and a long crest. When the wings are folded, the colors are mottled gray, the wings and tail barred with a darker shade; but when they are spread, the wings are seen to be barred and spotted with white and black arranged in a conspicuous pattern. The kagu is noteworthy for the extraordinary dances and antics which it performs.

Kaguan, kā-goo-ān'. See COLUGO.

Kahn, Julius, American politician: b. Kuppenheim, Baden, 28 Feb. 1861. Removing with his parents to California in 1866, he was educated in the public schools of San Francisco, and for ten years followed the theatrical profession. It failed to satisfy his ambition, however, and in 1890 he returned to San Francisco, where he studied law. In 1892 he was elected to the legislature of California, being admitted to the bar in 1894. He was elected to the 56th and re-elected to the 57th Congress as representative from the 4th district of California. He has championed with much energy the anti-Chinese bill and is regarded as one of the leaders of the movement to prohibit Chinese immigration to the United States.

Kahoka, kā-hō'ka, Mo., city and county-seat of Clark County, on the Keokuk & W. railroad, 20 miles west of Keokuk, Iowa. It is an important shipping point for a large farming and stock-raising region and there are numerous grain elevators, besides flour-mills, brick yards, and fruit canning establishments. The city is governed by a mayor and council elected biennially. Pop. (1890) 1,425; (1900) 1,818.

Kai-fung, ki-fūng', or **K'ai-Feng-Fu**, China, a walled city, capital of the province of Ho-nan, 450 miles southwest of Peking, and 11 miles distant from the Ho-ang-ho, or Yellow River. It was the capital city of China from 960 to 1129 and was then known as Pien-liang. The city has been visited 14 times by flood, 9 times by earthquake, and 6 times by fire. Kai-fung is a station on the New Hankow-Peking

KAI-PING — KALAHARI DESERT

railway. It has a large commercial trade with the interior. Pop. about 150,000.

Kai-ping, kī-ping', China, town in the province of Pe-chi-li, 80 miles north of Tien-Tsin. It is the centre of a large coal field, over 9,000 persons being employed in the mines. The output is over 800,000 tons annually. A branch railroad connects Kai-ping with the Trans-Siberian Railway.

Kaietur (kā-e-toor') Fall, a famous waterfall in British Guiana, on the Potaro River, a tributary of the Essequibo. It was discovered in 1870. Its total height is over 800 feet, and the sheer descent of the water 741 feet, the width of the hard rock over which it plunges being 370 feet. The water has worn a great cavern in the softer underlying layers, and against the dark background thus formed the whiteness of the spray is contrasted with magical effects. The scenery about this great waterfall enhances its beauty and grandeur.

Kailas, ki'lās, the highest summit of the Gangri Mountains in Tibet, between the sources of the Indus and the Brahmaputra, having an altitude of over 20,000 feet. It is a sacred mountain of the Hindus, who formerly regarded it as the abode of their gods.

Kain, kān, John Joseph, American Roman Catholic archbishop: b. Martinsburg, W. Va., 31 May 1841; d. Baltimore 13 Oct. 1903. Educated at St. Mary's Seminary he was ordained priest in 1860 and was for several years stationed at Harper's Ferry, W. Va. In 1875 he was consecrated bishop of Wheeling, and in 1893 he was appointed titular archbishop of Oxyrrychia as coadjutor to Archbishop Kenrick of St. Louis, succeeding to the archbishopric of St. Louis on the death of Archbishop Kenrick in 1895. Owing to failing health Bishop Glennon of Kansas City was made coadjutor in 1902, and succeeded him.

Kainite, ki'nit (from Greek καῦς, new), a complex substance, first discovered in 1865, found in the Stassfurt deposits of Germany and elsewhere, containing sulphates of potash and magnesium and chloride of magnesium. It is used in its natural state as a fertilizer, but much of it is employed in manufacturing potassium sulphate and double potassium-magnesium sulphate.

Kairwan, kir-wān', Tunis, a town 80 miles southeast of Tunis the capital, situated in a barren, sandy plain, and surrounded by a wall; founded about 670. It is connected by rail with Tunis and with the port of Susa, 30 miles distant. It ranks next to Tunis in population and trade, and is one of the holy Mohammedan towns; it was formerly almost inaccessible to Christians. Under the administration of the French, by whom it was taken in 1881, many modern improvements have been made, among which not the least important is a good water-supply. It has a variety of useful manufactures, including morocco, carpets, copper utensils, saltpeter, etc. Kairwan was the first seat of Saracenic empire in Barbary, and still has many fine relics of its ancient grandeur in the fragments of beautiful architecture which abound there, besides a number of interesting mosques, one of them being of great magnificence. Pop. (1900) about 27,000.

Kaiser, kī-zér, a title, the German equivalent for emperor. The Romans added the name of Caesar to their own kings in honor of the "divine Julius," and this passed to Kaiser in the 10th century. When the Holy Roman Empire was dissolved the imperial title was retained by the House of Hapsburg, the head of which since 1804 has borne the title of Emperor (Kaiser) of Austria.

Kaiser-Franzensbad. See FRANZENSBAD.

Kaiser Wilhelm Land. See NEW GUINEA.

Ka'ka, a large, slow-flying, brownish parrot (*Nestor meridionalis*) of New Zealand, which inhabits forests, where it goes about in noisy flocks, and nests in hollows of trees. Its food is miscellaneous, but consists principally of nectarous flowers and of the grubs hiding under bark, which it tears away by its powerful hawk-like beak. A near relative is the Kea (q.v.); and other species on New Zealand, Norfolk and neighboring islands have become wholly extinct since the occupation of those islands.

Kakabek'a Falls, a cataract of the Kaminiatiquia River, Ontario, Canada, 14 miles west of Port Arthur. The falls, which are noted for their picturesqueness, have a height of 130 feet, and their width is about 450 feet.

Kakapo, the Maori name of a large ground-keeping, owl-like parrot (*Strigops habroptilus*), which is now nearly extinct, owing to its inability to withstand the dogs, cats, rats, etc., introduced by civilization, in addition to which its flesh is good to eat. Its terrestrial habits have led to such a reduction of the wing-muscles that the keel has nearly disappeared from the sternum and the bird is practically flightless.

Kak'ar, a sportsman's name for a muntjac (q.v.).

Kakarali, kāk-a-rālī, a South American tree (*Lecythis ollaria*), whose timber is much used in British Guiana for piling and structures exposed to salt water, since it endures well, and resists the boring of shipworms and the attacks of barnacles. The Indians beat its bark until it separates into thin layers convenient for use as wrappings.

Kakke, kāk'kā, a summer disease common in Japan and not unlike the beri-beri of the Malay Peninsula. The disease which in 1850 was confined to a few localities is now almost a national scourge. It begins with a swelling of the legs, and general debility.

Kalafat, kā-lā-fat', Rumania, town in Wallachia, on the left bank of the Danube. Its natural position and extensive fortifications make it command the approach of the Danube at this point. Severe battles were fought here between the Russians and the Turks in 1839, 1854, and 1877. Pop. 2,500.

Kalahari (kā-lā-hā'rē) Desert, a region of South Africa, extending from the Orange River to Lake Ngami, and from Lon. 26° E. nearly to the west coast; partly in British, partly in German territory; called a desert because it contains little water; but besides grass and creeping plants there are large growths of bushes, and also trees; great herds of antelopes roam over its plains; and on the game thus provided, as well as on the vegetable products, particularly water-melons and large tubers, a great number

KALAKAUA—KALEEGE

of Bushmen and Bakalahari subsist. The Kala-hari is remarkably flat, and is intersected in different parts by the beds of ancient rivers. The soil is in general a light-colored soft sand, but in the ancient river-beds there is a good deal of alluvium, which, when baked hard, is so retentive that in some cases pools formed by the rain contain water for several months.

Recent studies have brought to light very interesting facts regarding the limestone basins of this region, peculiar formations, in which can be traced the influence of higher animal life on the shape of the earth's surface. These crater-like depressions served as watering-places for the large wild animals, and the crowding of great herds to these places, to drink and bathe, changed them from simple depressions to the walled basins which they now are, elephants and other animals, by rolling in the mud and rubbing against the walls, giving to the hollows their depth—sometimes 20 to 30 feet—and a diameter commonly of several hundred yards. The water in these basins contained lime carbonate in solution, and with the water drunk by the animals this carbonate disappeared, and the fresh spring-water absorbed another supply from the rock, thus deepening the depression. Scientists estimate that 600 to 800 years may have passed before the natural water-pools became basins. It is surmised that similar depressions in calcareous districts of the American prairies are due, in the same way, to the enormous herds of bisons which formerly inhabited them.

Kalakaua (käl-a-kow'a) I., David, king of Hawaii: b. 16 Nov. 1836; d. San Francisco, Cal., 30 Jan. 1891. He was the son of Kepaakea and Keohokalole, the niece of Kamehameha I., and was elected, 12 Feb. 1874, to succeed Lunalilo, and reigned till his death. In 1887 he was compelled to grant a new constitution, which very greatly restricted the royal authority.

Kalamazoo, käl-a-mä-zoo', Mich., city, county-seat of Kalamazoo County; on the Kalamazoo River, and on the Michigan C., the Lake Shore & M. S., the Kalamazoo & S. H., the Grand Rapids & I., and the Chicago, K. & S. R.R.'s; about 60 miles southwest of Lansing and 45 miles south of Grand Rapids. It was settled in 1829 by Titus Bronson, was incorporated in 1831, and chartered as a city in 1884. It is in a rich agricultural region, the chief products of which are celery, fruits and grains. The chief manufactures of the city are paper, patent medicines, women's clothing, playing cards, wagons and carriages, machinery, caskets, coffins, foundry products, windmills, furniture, and flour. The nine paper mills (1903) employ 2,000 workers; the card factory, 900; the regalia and clothing factories, 1,000; and there are 3,000 engaged in celery growing. The principal trade is in manufactured articles, and celery and other farm products. Some of the prominent public institutions are the Kalamazoo College, opened in 1855 under the auspices of the Baptist Church; the Michigan Female Seminary, founded in 1866 under the auspices of the Presbyterian Church; Nazareth Academy (R.C.), one normal school, Borgess and Queen City hospitals, Saint Anthony's School for feeble-minded children, Michigan asylum for the insane, Academy of Music, and the public library. Other prominent buildings are the Y. M. C. A.,

the city-hall, several churches, and the high school. The city has eight banks with a combined capital of \$6,500,000 (1903). The government is vested in a mayor, public commissioners, and a council of nine members, elected annually. The school board is chosen by popular election. The electric-light plant and water-works are owned and operated by the city. About 2,000 inhabitants are from Holland. Pop. (1890) 17,853; (1900) 24,404.

ELTON R. EATON,
Editor of 'Gazette-News.'

Kalamazoo, a river which has its rise in the northwestern part of Hillsdale County, Mich., and flows west and northwest into Lake Michigan. From the source to the city of Kalamazoo it makes three southward curves, but from Kalamazoo the course is generally northwest. Its whole length is about 200 miles, only 50 of which are navigable. At the mouth is a good harbor for vessels of about 100 tons. The water-power is extensive, and has been of great value in the development of the southwestern part of Michigan. Allegan, Kalamazoo, Battle Creek, and Marshall are on this river.

Kalb, Johann, yō'hän kälb, BARON DE, officer in the American Revolution: b. Hütten-dorf, Bavaria, 29 July 1721; d. Camden, S. C., 19 Aug. 1780. After serving in the French army as lieutenant he became a brigadier-general in 1761. He came with Lafayette to America in 1777, and offering his services to Congress was appointed a major-general in September of that year. After serving under Washington in Pennsylvania and New Jersey till the spring of 1780, he was appointed second in command in the Southern army under Gates. He fell mortally wounded at the battle of Camden, S. C., in the following August, dying three days after. In 1886, on the 106th anniversary of the battle, a bronze statue of the baron was unveiled at Annapolis, Md. Consult Kapp, 'Leben des amerikanischen Generals, Joh. Kalb' (Stuttgart 1862; New York 1870).

Kale, or **Borecole**, a cruciferous plant (*Brassica oleracea*, var. *acephala*), differing from cabbage most strikingly in the non-formation of heads, the leaves being loose and free. It is largely cultivated as a pot-herb, especially in the South, where it generally withstands the winter. It is rather coarse in texture and flavor, but frosts modify both somewhat. In some sections it is extensively used for cattle-feeding. One of the largest producing regions is that in the vicinity of Norfolk, Va., which ships about 200,000 barrels to the markets each year. The varieties cultivated in America are nearly all treated as annuals, being grown from seed much like late cabbage. Some varieties however, are perennial and may be propagated by cuttings, etc. For cultivation see CABBAGE.

Kaleege, ka-léj', or **Kalij**, **Pheasants**, a sportsmen's name in India for the pheasants of the genus *Genus*, which range along the foot-hills of the Himalayan range and eastward to the China and down the Malay Peninsula to Java. They are of medium size, richly dressed, with flattened crests, naked cheeks and spurs on the male. White is conspicuous in the plumage of most, so that they are sometimes called silver pheasants, especially the Chinese species (*G. nycthemerus*), frequently seen in parks and

KALEIDOSCOPE — KALPI

menageries. All are attractive as game birds, especially the Himalayan white-crested and black-crested.

Kaleidoscope, kā-lī'dō-skōp, an optical instrument invented by Sir David Brewster in 1817. It consists of a tube through the length of which pass two mirrors or reflecting planes, which are hinged together along one edge, and make with each other an angle of 180 degrees; while the one end is fitted up with an eye-glass, and the other is closed by two glasses, at a small distance from each other, between which are placed little fragments of glass or other colored objects. The eye looking into the tube perceives these objects multiplied, and the slightest moving of the instrument produces new figures.

Kalends. See CALENDAR.

Kaler, James Otis, "JAMES OTIS," American writer for young people: b. Winterport, Maine, 19 March 1848. His most popular juvenile tale is "Toby Tyler" (1880). Among his other very numerous books may be named: "Raising the Pearl"; "Tom and Tip"; "When Israel Putnam Served the King"; "The Wreck of the Circus."

Kalevala, kā-lē-vä'lä, **The**, the great Finnish epic. It is composed of ancient popular songs, orally transmitted until the early 19th century, when they first began to be collected for literary purposes. Scattered portions were published in 1822 by Zacharias Topelius. But the present form of the poem is due to Elias Lonnrot of Helsingfors, who traveled among the peasantry, and recorded the material exactly as he heard it. His first edition (1835) contains 12,078 lines in 32 runes (cantos); a second edition (1849) 22,793 lines in 50 runes. Lonnrot was the first to arrange the runic verses as a systematic whole. The poem is in eight-syllabled trochaic verse, alliterative but unrimed. An idea of its style may be obtained from the "Hiawatha" of Longfellow, largely an imitation. There is a complete English rendering by J. M. Crawford (1888).

Kali, kā'lē, a Hindu goddess represented with four arms, wearing a necklace of skulls, and the hands of slaughtered giants round her waist as a girdle. Her eyebrows and breast appear streaming with the blood of monsters she has slain and devoured. One hand holds a sword, another a human head. She is the goddess of death and destruction, and goats and other animals are sacrificed on her altars.

Kalidasa, kā-lī-dā'sā, the greatest poet and dramatist of India. Native tradition assigns him to the 1st century B.C., but western scholars place him as late as the 6th century A.D. He was one of the nine "gems," or poets, at the court of King Vikramaditya, but the fact that several monarchs were so named makes his date no more definite. His most famous work is the drama "Sakuntalā," translated by Sir William Jones in 1789, and highly praised by Goethe. This translation helped to call the attention of the Occidental world to Sanskrit studies. Kalidasa wrote two other plays, the "Vikramorvāśi" and "Mālavikā and Agnimitra," and considerable lyric verse. Many doubtful works have also been attributed to him with various degrees of probability. His literary value has long been conceded. The most re-

cent English version of the "Sakuntalā" is that of Edgren (1894).

Kalisch, kā'lish, **Isidor**, American rabbi and author: b. Krotoschin, Prussia, 15 Nov. 1816; d. Newark, N. J., 11 Nov. 1886. Educated at the universities of Berlin, Breslau, and Prague, on the outbreak of the revolution of 1848, he left Germany, and after a brief stay in London came to New York in 1849. For some years he officiated as rabbi in Cleveland, Cincinnati, Milwaukee, Indianapolis, Detroit, and Leavenworth, Kan. In 1868 he established a school in New York, which did not succeed. In 1870 he was called to Newark, N. J., as rabbi, and two years later to Nashville, Tenn. In 1875 he returned to Newark, where he devoted himself until his death mainly to literary work. He was a versatile author, and his works cover a wide field, from a volume of German poems and a translation of Lessing's "Nathan the Wise" to a decipherment of a Phoenician inscription found near Sidon, a sketch of the "Sefer Yetzira," a Kabbalistic work. He took an active part in the American Jewish reform movement and was a frequent contributor to the Jewish press.

Kal'ium, another name for the metal potassium, whence its symbol K is derived.

Kalmar, kāl'mär, or **Calmar**, Sweden, city, the capital of Kalmar Lan (county); on Kalmar Sound, at a place where the distance to the island of Oland is not more than five miles. Kalmar is about 190 miles, in direct line, southwest of Stockholm. A part of the city is on the mainland, and a part on three small islands. The town, which was formerly strongly fortified, though the fortifications are now in great part leveled, has a good harbor, a handsome cathedral, and a fine castle, in which, on 20 July 1397, the "Union of Kalmar" was signed, which settled the succession to the three northern kingdoms upon Margaret of Denmark and her heirs. The commerce of the town is considerable, and it has manufactures of matches, chicory, and tobacco, and some ship-building Pop. (1902) 12,847.

Kal'mia. See MOUNTAIN-LAUREL.

Kalmucks, a nomadic, warlike Mongol race, inhabiting parts of the Chinese empire, Siberia and European Russia. They have been great warriors from very early times, fought many bloody battles with the Tartars, with the Chinese, and among themselves, and made predatory expeditions as far west as Asia Minor. They are intrepid soldiers, splendid horsemen, and troops of them are attached to almost every Cossack regiment. Physically the Kalmucks are small of stature. They number altogether perhaps 700,000.

Kalong'. See FLYING-FOX.

Kal'pa, in Hindu chronology, a day, or a day and night of Brahma, or a period of 4,320,000 or 8,640,000 solar-sidereal years. A great kalpa comprises the life of Brahma.

Kalpi, kāl'pē, or **Calpee**, British India, a town in Jalaun district, Northwest Provinces, on the right bank of the Jumna, about 45 miles south-southwest of Cawnpore. The original town stood on the plain, remote from the river; but repeated Mahratta incursions induced the inhabitants to remove it to its present position

KAMA — KAMEHAMEHA

among extensive ravines, where there is a small fort, which commands the navigation of the Jumna. It carries on a considerable trade, principally in cotton, and is noted for its manufactures of paper and refined sugar, the latter said to be the finest in the world, but too highly priced to be in general demand. During the Sepoy mutiny Kalpi became a principal rendezvous of the revolted Gwalior contingent, which was signally defeated, first by Sir Colin Campbell, in the vicinity of Cawnpore, on which it had previously made an unsuccessful attack, and afterward at Kalpi itself by Sir Hugh Rose, 26 May 1858. Pop. (1901) 15,124.

Kama, kā'mā, the largest tributary of the Volga, rises in the Ural Mountains, on the eastern frontiers of the Government of Vyatka, in Russia; flows first north, then northeast into the Government of Perm, then circuitously south-southeast to the town of Perm, then southwest into the Government of Kasan, and about 40 miles below the town of that name, after a course of about 1,200 miles, joins the left bank of the Volga, almost doubling its volume. It is navigable almost throughout its whole course, and a canal connecting it with a tributary of the Dwina, gives water communication between the Caspian Sea and the Arctic Ocean.

Kama, or **Kâmâdiva**, in Hindu mythology, the god of love and marriage. The accounts of his origin vary in the sacred writings of India. According to one authority he sprang from Brahma's heart. His wife is Rati or "Pleasure."

Kamakura, kā-mā-koo'rā, Japan, village, about 11 miles south of Yokohama. It is said to have been founded in the 7th century. From about 1190, for 400 years it was the political centre of Japan, the residence of many of the powerful men, and frequently the battle-ground for supremacy and power. It is no longer visited as a ruling city, but as a beautiful place, with many interesting relics of antiquity. See DAIB TSU.

Kamala, a plant and drug known, under various names, to Indian and Arab physicians, as a specific against the tapeworm. It occurs as a brick-red powder, adherent to the fruit of the euphorbiaceous plant *Rottlera tinctoria*, formed by minute roundish, semi-transparent granules, mixed with stellate hairs. The active principle of the powder lies in the 80 per cent of resin it contains, which also supplies the coloring matter, called rotllerin, used as a silk dye.

Kamas'si, a South African tree related to the oleander (family *Apocynaceæ*), the wood of which is extremely hard and durable, and is used in wagon-building, for tool-handles and similar purposes. The tree bears fragrant flowers.

Kambodja, kām-bō'ja, a Burmese tree (*Plumeria acutifolia*) related to the oleander, which is commonly used as a shade-tree in the villages of that country.

Kamchatka, kām-chät'kā, or **Kamtchatka**, Siberia, a large peninsula of the Russian empire, 850 miles long from north to south, and of irregular breadth, the maximum being about 250 miles. It has an area of 100,000 square miles. The coasts are dangerous of approach on account of outlying reefs. A lofty range of volcanic mountains traverses the country in a southwesterly direction, with many peaks be-

tween 7,000 and 16,000 feet high. The snow line, in lat. 56° 40', is at an elevation of 5,260 feet. Dittmar, a Russian traveler, devoted three years to the exploration of the geology of Kamchatka. He traced five successive formations, and found 17 volcanoes in active operation. Numerous rivers have their rise in the heights. The Kamchatka, with its affluent the Yelovka, is navigable for 150 miles. The most fertile portion of the peninsula for agricultural purposes lies along the valley of this river. The Russian settlers here raise oats, barley, rye, potatoes, and garden vegetables, but the rest of the country is little adapted for culture. The climate is very severe; the winter lasts nine months, and frost is common at all seasons. The mean annual temperature at Petropavlovsk on the east coast is 28.5°, while at Tigil on the west it is 43°. The average temperature of summer at the former place is 55.5°, and that of winter 19°, but the thermometer has been known to fall as low as -25°. Earthquakes are frequent and violent. Animal life is very abundant, and fish swarm in the seas and rivers. The wild animals, yet abundant in the more sequestered localities, are bears, wolves, reindeer, argalis or wild sheep, black, red, and gray foxes, ermines, sables, and otters. Wild fowl are very numerous. The principal varieties of fish are herrings, cod, and salmon. Whales are numerous in the adjacent seas. The mountains are covered with forests of birch, larch, pine, and cedar, of considerable size in the south, but diminishing northward until the northernmost portion of the territory is covered only with reindeer moss.

The Kamchadales, the principal native tribe, are of diminutive stature, but stout, with flat features, small eyes, thin lips, lank black hair, and scarcely any beard. They are a peaceable, honest, lazy, and intemperate race. In winter they reside in a sunken hut, in summer in one elevated on poles some 13 feet from the ground. Their dress is equally adapted to the changes of temperature, being of fur in winter and nankin in summer. They are nominally governed by their own chiefs, under the jurisdiction of the Russian *ispravnik*, or chief judge, and the most of them are Greek Catholics. Dog trains are used as the means of transport. The other principal tribe are the Koryaks, who live north of lat. 58°. While the Kamchadales are hunters and fishermen, with fixed habitations, the Koryaks are a wandering tribe, subsisting on the produce of the reindeer, and differing from them in language and mode of life. The commerce of Kamchatka is chiefly with Okhotsk. Its exports are furs, skins, oil, etc. Its imports are flour, sugar, dry goods, whiskey, rice, and coffee, almost all passing through the port of Petropavlovsk, the capital, on Avatska Bay. Pop. of capital, 8,000.

Kamehameha, kā-mä'hä-mä'hä or kā-më-hä'më-hä, the name of five kings of the Sandwich or Hawaiian Islands. **KAMEHAMEHA I.**, surnamed the "GREAT": b. 1753; d. Kailua, Hawaii, 8 May 1817. Becoming head chief of part of the island of Hawaii in 1781 he presently subdued the entire group of islands, becoming ruler of the whole in 1811. He was progressive in his views and encouraged intercourse with Europeans. He was succeeded by his eldest son, **KAMEHAMEHA II**. (LIHOLIHO):

KAMEHAMEHA—KAMPEN

b. Hawaii 1797; d. London 14 July 1824. He was intemperate but treated the missionaries kindly, professed Christianity, and recommended his subjects to do likewise. Anxious to secure the friendship of England he went thither with his queen, Kamamalu, but both died soon after arriving in London. He was succeeded by his brother KAMEHAMEHA III. (KAVIKEAOU), surnamed the "Good": b. 7 March 1814; d. Honolulu 15 Dec. 1854. He came to the throne in 1833, the islands having been ruled by a regency since 1824. He introduced a constitutional form of government in 1840, and the independence of the islands was acknowledged by the United States in 1842 and by Belgium, Great Britain, and France in 1844. The more important public offices in his reign were filled by foreigners. He was succeeded by his adopted nephew KAMEHAMEHA IV. (ALEXANDER LIHOLIHO): b. 9 Feb. 1834; d. Honolulu 30 Nov. 1863. He married in 1856 Emma, adopted daughter of Dr. Cooke. In 1860 he founded the Queen's Hospital in Honolulu, personally soliciting subscriptions for this object, in which he took the deepest interest. His elder brother, Lot Kamehameha, succeeded him as KAMEHAMEHA V.: b. 11 Dec. 1830; d. Honolulu 11 Dec. 1872. He proclaimed a new constitution (less democratic than its predecessor), in 1864, satisfactory to the majority of the Hawaiians but distasteful to the foreign population. He never married and left no heir to the throne.

Kamehameha, Order of, an Hawaiian secret society founded in Honolulu in 1864 by Kamehameha II., the then reigning king of the Sandwich Islands. The order is divided into three classes. The badge of the order is a white enameled cross with gold rays surrounded by a crown.

Kamerun, kā-mē-roon'. See CAMEROONS.

Kames, Lord. See HOME, HENRY.

Kamila, kā-mē'lā, or **Kamala**, the glandular hairs of a small euphorbiaceous tree (*Mallotus philippensis*), widely distributed in eastern Asia and Australia. They are ground into a resinous powder which imparts a deep brick-red color to alkaline liquids, alcohol, ether and chloroform, and forms a rich dye especially applicable and extensively used for silk. The same name variously spelled is given to the tree.

Kaministiquia, ka-mī-nīs-ti-kē'a, a river in Canada which has its rise near Lake Nipigon in the province of Ontario, and flows south into Thunder Bay, an inlet of Lake Superior. The town where the Canadian Pacific railroad crosses this river is named after the river. Along the course are several expansions of the river or lakes. Before the railroad entered this section this river and its tributaries formed important routes of travel. Its advantages for transportation were of great importance to the government at the time of the Riel Rebellion (q.v.) in 1870.

Kaminski, kā-mēn'skē, **Stephan**, American Polish Catholic Independent bishop: b. German Poland, 26 Dec. 1859. He was educated in Poland, came to the United States in 1884; was ordained priest in 1893; was rector of various parishes; from 1897 edited and published the "Warta," a Polish weekly; and in 1898 was

consecrated bishop. He was a leader in the independent church movement.

Kammat'ograph, **The**, a photographic camera in which a circular glass plate takes the place of the celluloid film for moving the pictures. The plate can be made to rotate rapidly by means of a multiplying gear, and at the same time to traverse laterally. A small lens forms an image upon the plate, and when the plate is put in motion these images are multiplied into a series of pictures arranged in a spiral. The plate is developed in the same way as an ordinary negative, and a positive is then taken from it. To display the pictures it is only necessary to place the positive in the camera and to arrange it so that the beam from the lantern close to it can pass through the lens. The plate is then rotated as before, the succession of pictures projected upon the screen reproducing the original movement. About 600 pictures can be photographed during the motion of a single plate at the rate of 12 or 14 a second.

Kamloops, Canada, city in the province of British Columbia; on the Thompson River at the junction of the north and south branches, and on the Canadian Pacific railroad; about 255 miles northwest of Rossland and 260 miles northeast of Vancouver. The place where the city now stands was once used as a trading post by the Hudson's Bay Company, but a permanent settlement was made in 1820. Its growth was slow until mining began in the vicinity, and in 1892 it was incorporated. It has several manufacturing establishments, the chief of which are lumber-mills, mining-implement works, wagon factories, tanneries, and a woolen mill. The waterworks and the electric-light plant are owned by the city. The government seat for the Yale District is Kamloops, and the Dominion and Provincial governments have here land and registry offices. It has a mild climate, and in the vicinity in the river valley are many fine farms. Nearby are mountains and small lakes noted for the beauty of their scenery. Pop. (1902) 1,671.

Kampen, kām'pēn, or **Campen**, Jacob de, Dutch Anabaptist leader. When he and his followers were driven out of Upper Germany, they attempted to diffuse their dogmas over the Low Countries. In 1534 John of Leyden nominated him bishop of Amsterdam, but on attempting to take possession of his see, he met with a cruel death at the hands of the people.

Kampen, or **Campen**, Jan van (so called from the town of Kampen), Dutch scholar: b. Kampen, Holland, about 1490; d. Freiburg 1538. He was professor of Hebrew at Louvain 1519-31. He wrote a Latin paraphrase of the Psalms, which has been translated into the chief European languages.

Kampen, Nikolaas Godfried van, Dutch historian: b. Haarlem 15 May 1776; d. Amsterdam 15 March 1839. He became professor of English and German in the University of Leyden in 1815. Among his historical and literary works, many of which were translated into German, are: 'History of the Literature of the Netherlands' (1812); 'History of French Domination in Europe' (1815-23); 'History of the Influences of the Netherlands Outside of Europe'

KAMPEN—KANE

(1831-3). Consult: 'Life,' by S. R. Van Campen (1887).

Kampen, or **Campen**, Holland, a town and port in the province of Overijssel, 45 miles east-northeast of Amsterdam, on the Yessel near its influx into the Zuyder Zee, and where it is crossed by a bridge. Its principal buildings are a church of the 14th century, an elegant town-house, built in an antique style, and a custom-house. A theological school is located here. Anciently it was one of the most flourishing of the Hanse towns; and its commerce after a period of decline has again to some extent revived. Its manufactures also suffered, but it still produces machinery, steam-engines, hosiery, cigars, etc. It has also ship-building yards. Several canals intersect it, and a railway line from Germany through Zwolle terminates here. Pop. (communal) 20,000.

Kamphausen, Adolf Hermann Heinrich, à'dôlf hér'man hin'rih kamp'how-zén, German theologian: b. Solingen 10 Sept. 1829. He was educated at Bonn, in 1855 became secretary of Karl Josias Bunsen, whom he assisted in the latter's 'Bibelwerke,' and in 1863 was appointed professor of theology at Bonn. In 1871-90 he was active as a member of the theological commission for the revision of Luther's translation of the Old Testament. He resigned all professorial duties in 1901. His publications include: 'Das Lied Moses' (1862); 'Die Hagiographen des Alten Bundes nach den überlieferten Grundtexten übersetzt' (1868); 'Das Buch Daniel' (1893); 'Das Verhältnis des Menschenopfers zur israelitischen Religion' (1896). He also edited Daniel (1896) for Haupt's 'Polychrome Bible.'

Kan-Su, kán-soo', an inland province of China, in the northwestern part; area, about 125,380 square miles. At one time Shan-Si, on the east, was a part of Kan-Su, and until 1865 its jurisdiction extended over a much greater extent of territory than at present. The capital is Lan-Chau. The province is rich in minerals and hunting for the sake of the fur is one of the chief occupations. Tobacco of a superior quality is raised in this province. Pop. about 10,000,000.

Kanakas, ká-nak'az, a popular name given the natives of Hawaii, New Caledonia, New Hebrides, and other islands in the South Seas.

Kananur, ká-ná-noor', or **Cananore**, British India, a seaport town in the district of Malabar, presidency of Madras, 44 miles northwest of Calicut. It forms a municipality, and contains various public offices, jail, dispensary, schools, custom-house, etc. There are Anglican, German, and Roman Catholic missions here, and a number of mosques. It has a small trade by sea, but its chief importance is as a military station and the headquarters of the Malabar and Kananur force, being garrisoned by one European and one native regiment. There is a fort of triangular area, built by the Dutch and occupied by them till 1766. Pop. 27,418.

Kana'ri, or **Canari**, a tree of the genus *Canarium* (q.v.), many species of which flourish from India to Australia and the Philippines. The foliage is abundant and handsome, and the wood is hard, heavy and suitable for cabinet-

work, house-trimming, etc. The fruit is a drupe with a hard oily kernel, which forms the particular food of the great cockatoos of the region. The kernel of *C. commune*, known as Java almond, is eaten by the natives either fresh or roasted; and the Amboynese dry it, grind it and bake the flour. Some other species also furnish edible kernels; and from all an oil may be pressed, said to be better than cocoanut oil, both for cooking and for use in lamps. An oil is obtained from the bark resembling balsam copaiba (see COPAIBA). These trees also yield the medical resin elemi, and a gum called black damar.

Kanawha River. See **GREAT KANAWHA RIVER**.

Kan'chil, the smallest species of chevrotain (q.v.). It inhabits Java and neighboring islands, is less than a foot tall, and is proverbially quick and clever in its movements and hiding in the forest. Its scientific name is *Tragulus javanicus*.

Kandahar, kän-dä-här', or **Candahar**, Afghanistan, one of the largest cities of the principality, on a fertile and well-cultivated plain, 3,484 feet above the sea, 200 miles southwest of Kabul. It is enclosed by a mud wall 27 feet high, with a large tower at each of the four corners, 54 semi-cylindrical bastions, and a broad and deep ditch in front, capable of being filled with water from the river. There are six gates, each protected by double bastions. The circumference of the city is nearly four miles. One of the most imposing buildings is the octagonal, domed structure containing the tomb of Ahmed Shah. It is claimed that this city was founded by Alexander the Great. Kandahar is chiefly supported by the transit trade, but it has important manufactures of felt and silk. It was held by the British in 1839-42, and again in 1879-81. Pop. variously estimated at from 25,000 to 100,000.

Kandy, kän'dé, or **Candy**, Ceylon, one of the chief towns on the island, is situated near the centre, 72 miles northeast of Colombo, at the height of about 2,000 feet. "Kandy is uniquely beautiful—the most charming little town in the world," travelers usually describe it. It is situated in a valley surrounded by hills, and boasts an artificial lake, Buddhist and Hindu temples, including the Daladá Máligáwa, the most sacred Buddhist temple in the world. This contains the so-called relic of Buddha's tooth, and also many ancient manuscripts written in Pali and Sanskrit. "The Pavilion," or official residence of the governor, is one of the finest structures in Ceylon. Kandy is connected by railroad with Colombo. The botanic gardens of Peradenia are three miles from Kandy. Kandy was the capital of the ancient kings of Ceylon. Pop. (1901) 26,915.

Kane, Elisha Kent, American Arctic voyager: b. Philadelphia 20 Feb. 1820; d. Havana, Cuba, 16 Feb. 1857. He was graduated as M.D. in the University of Pennsylvania in 1842, and shortly afterward became surgeon to the American embassy to China. After extended travels in India, Egypt, and the continent of Europe he returned to America in 1846, and was employed in the government survey of the Gulf of Mexico. In 1850 he obtained the appointment of senior medical officer to the expedition of two vessels, the Advance and the Rescue, which sailed from

KANE — KANGAROO

New York on the 22d of May in that year in search of Sir John Franklin. On the return of the expedition Dr. Kane published 'The United States Grinnell Expedition in Search of Sir John Franklin—a Personal Narrative.' On the 31st of May 1853, the Advance alone, under Dr. Kane's command, sailed again from New York to resume the search, and proceeding up Baffin's Bay and through Smith's Strait, reached lat. 78° 43' N. Here the Advance remained frozen up for 21 months, and was finally abandoned because provisions were becoming scarce and scurvy and other diseases had made their appearance. The object now was to reach the Danish settlements in Greenland, about 1,300 miles distant. This long and perilous journey, partly in boats and partly in sledges, was accomplished, after 10 weeks of severe privation, with the loss of only one man, and that by an accident. In 1856 Dr. Kane published: 'The Second Grinnell Expedition,' and was awarded gold medals from Congress, the New York legislature and the Royal Geographical Society. Consult: Elder, 'Biography of Elisha Kent Kane' (1857); Greely, 'American Explorers' (1894).

Kane, John Kintzing, American jurist: b. Albany, N. Y., 16 May 1795; d. Philadelphia, Pa., 21 Feb. 1858. He was graduated from Yale in 1814, was admitted to the bar in 1817, entered practice in Philadelphia, was elected to the Pennsylvania legislature as a Federalist in 1823, later became a Democrat, and supported Jackson in the canvass of 1828. In 1845 he became attorney-general of Pennsylvania, in 1846 United States district judge for Pennsylvania, in 1856 president of the American Philosophical Society. He won distinction by his legal attainments and his decisions in patent and admiralty law, but his commitment of Passmore Williamson for contempt of court in an action under the Fugitive Slave law was attacked by the Abolitionists.

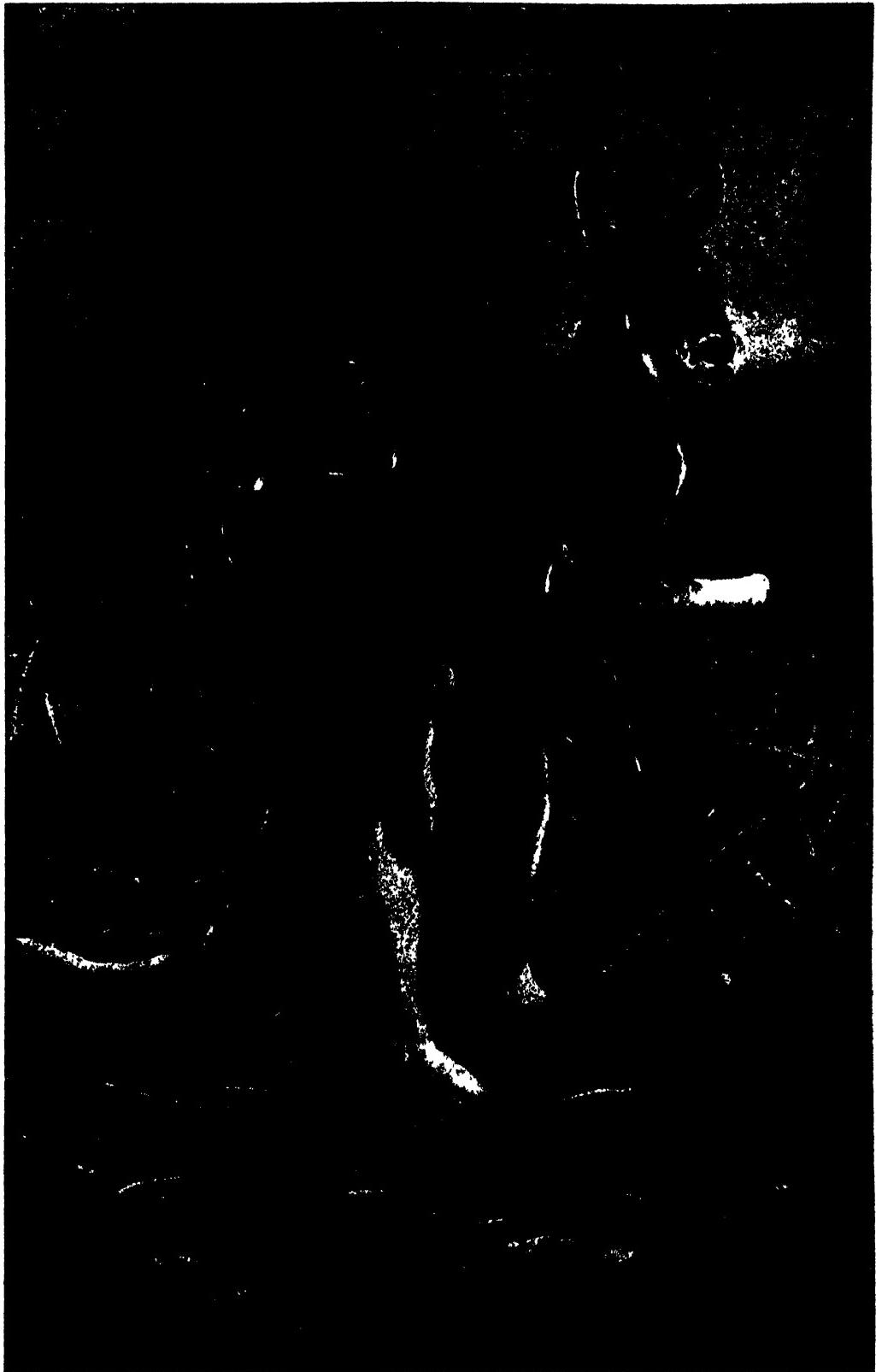
Kane, Sir Robert John, Irish chemist: b. Dublin, Ireland, 24 Sept. 1809; d. there 16 Feb. 1890. He was educated for the medical profession and in 1832 became a member of the Royal Irish Academy. In the same year he founded the 'Dublin Journal of Medical Science' and was its editor for two years. From 1834 to 1837 he was professor of natural philosophy to the Royal Dublin Society; in 1846 originated the Museum of Industry in Ireland. He was knighted the same year, was president of Queen's College, Cork, for several years prior to his resignation in 1873, and in 1876 was elected president of the Royal Irish Academy. He wrote: 'Elements of Chemistry' (1842); 'Industrial Resources of Ireland' (1884); etc.

Kane, Pa., borough in McKean County, on the Baltimore & O., the Philadelphia & E., the Pennsylvania, and the Pittsburg & W. R.R.'s, 95 miles southeast of Erie, 175 miles north of Pittsburg and 122 miles from Buffalo. There are here several of the largest window glass factories in the world, plate glass and bottle factories, lumber-mills, wooden-ware factories and other flourishing industries. There are extensive natural gas and oil wells and deposits of silica in the surrounding country which are of great commercial benefit to the town. On account of its elevation of 2,000 feet, Kane is an attractive summer resort, with good hunting and fishing

grounds in the vicinity. It was first settled in 1859 and became a borough in 1887. The government is vested in a burgess and a council of 9 members elected every three years. Pop. (1890) 2,944; (1900) 5,296.

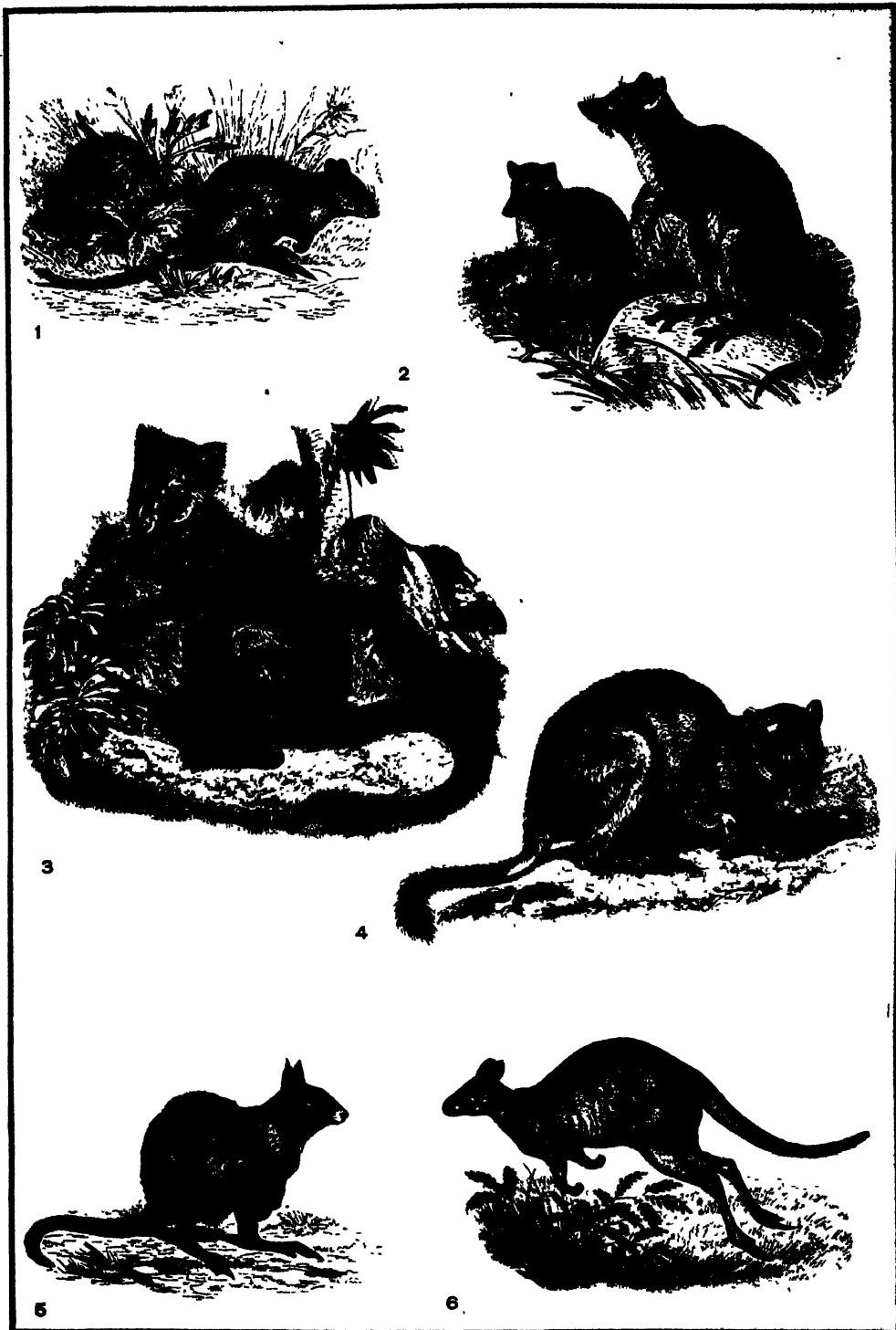
Kang-Hi, kāng-hē', or **K'ang-Hai**, emperor of China: b. 1655; d. 1722. He succeeded his father, Shun-Chih, founder of the Manchu dynasty, in 1661, but until he was 14 the government was administered by a regency. Kang-Hi not only greatly strengthened his empire, but extended it and governed with vigor and wisdom. He was favorably inclined toward the progress of Christianity; manifested great interest in the arts and sciences of the Europeans, and liberally patronized the missionaries. During his reign many important books were published under his oversight, such as the 'Imperial Dictionary'; a literary concordance in 110 volumes styled 'Pei-Wen-Yun-Foo,' and two large encyclopædias.

Kangaroo', an Australian marsupial of the family *Macropodidae*. The word is derived from a native name of the giant kangaroo. The *Macropodidae* are readily distinguished from other marsupials by their shape. The head is small, with large mule-like ears; the neck slender, the trunk narrow before and very massive behind; the fore limbs small and weak with five toes and used chiefly as hands; the hind limbs long, extremely powerful, four-toed, and serving as the chief organs of locomotion; and the tail thick, heavy, and muscular, serving to support the body, in combination with the hind legs, as on a tripod. The dentition is noteworthy, having a somewhat rodent-like appearance. There are three pairs of incisors above, presenting a sharp cutting edge which the single pair of lower incisors passes like the blade of a shears. Canines are reduced to one in the upper jaw. The premolars are two on each side of each jaw. The four pairs of molars are flat-crowned and more or less cross-ridged, as well as tuberculate. The kangaroos are strictly vegetarian, and in Australia represent the deer, antelopes and hares of other regions. About 50 species belonging to 12 or 15 genera have been described from Australia and the neighboring islands. The giant kangaroo (*Macropus giganteus*), the largest, is frequently exhibited in zoological gardens. This, the first of the kangaroos known to white men, was discovered by Capt. Cook during his exploring voyage in 1770, and was described under the name *Didelphys gigantea* from specimens brought home by him. When standing erect in the attitude of scenting danger it is nearly as tall as a man, and when in full flight propels itself by bounds of 12 to 15 feet. On account of its destructiveness to herbage on the sheep-ranges, as well as for sport, it is much hunted by the colonists, a favorite method being coursing. When brought to bay by the hounds it proves no mean antagonist, and frequently kills a dog by seizing it in its arms and ripping it open with the great hind toe. As in other kangaroos the hind feet have a peculiar structure; the fourth toe is enormously developed and furnishes almost the sole support; the fifth is of moderate size; in sharp contrast the second and third toes are minute, slender, and bound together so that only their sharp claws project from the skin, their only function being to comb and cleanse the fur.



GIANT KANGAROO (*Macropus rufus*).

KANGAROOS.



1. Kangaroo Rat.
2. Hypsiprymnodon.
3. Tree Kangaroo.

4. Rock Kangaroo.
5. Hare Wallaby.
6. Pademelon Wallaby.

KANGAROO-RAT — KANSAS

The one or two young are born in an exceedingly helpless state, and after being placed in the pouch of the female remain attached by their mouths to the nipples for several weeks or months; at first they are quite incapable of sucking, and the milk is injected into their mouths by the periodical contraction of the muscles of the mammary glands. Even after they are able to run about, they return to the mother's pouch for temporary rest and shelter. Closely related are the red kangaroo (*M. rufus*) and other species inhabiting the mountains, and the numerous species of large and small wallabies or brush-kangaroos, some of which inhabit New Britain and New Guinea, as well as Australia. The rat-kangaroos (*Potorous* and related genera) are a small group of species somewhat resembling rats and rabbits in size and habits. They are nocturnal and obtain their food largely by digging roots. The genus *Dendrolagus* includes the arboreal tree-kangaroos. Fossil forms are exhumed from the Pleistocene rocks of Australia very similar to modern genera, but some of the older ones were much larger than any existing species. Consult: Thomas, 'Catalogue of Marsupialia, and Monotremata in the British Museum'; Gould, 'Monograph of the Macro-podidae,' and 'Mammals of Australia,' and Aflalo, 'Natural History of Australia.'

Kangaroo-rat, a small and pretty jerboa-like rodent of the southwestern United States. It has very long and strong hind legs, and runs by a series of leaps with great swiftness. It inhabits arid regions, dwells in extensive burrows of its own digging, and feeds mainly upon sun-flower-seeds, great quantities of which are stored up for winter use, when the burrows are warmly furnished with grass. It belongs to the pocket-mouse family (*Heteromyidae*) and is named *Perodipus ordi* by systematists. Consult: Stone and Cram, 'American Animals' (1902).

Kangaroo-mice are smaller American rodents of the genus *Perognathus*. See POCKET-MICE.

Kankakee, kän-ka-kē', Ill., city, county-seat of Kankakee County; on the Kankakee River, and on the Illinois C. and the Cleveland, C. C. & St. L. R.R.'s; about 133 miles northeast of Springfield and 56 miles south of Chicago. It was settled in 1850 and incorporated as a city in 1854. The water-power of the Kankakee River is extensive at Kankakee, and as a result the city is largely engaged in manufacturing. It is situated in an excellent agricultural region, and its good railroad facilities make it an important commercial centre for a large extent of country. The chief industrial establishments (1903) are agricultural implement works, in which are employed 600 men; piano factories, 250 men; furniture factories, 500; knitting works, 250; sewing machines, 300; and stone quarries, 250. Some of the other manufactures are starch, flour, wagons, bricks, tiles, nails, foundry products, mattresses, cigars, some dairy products. The churches are two Methodist Episcopal, one Presbyterian, four Roman Catholic, one Lutheran, one German Methodist, one Reformed Lutheran, one Seventh Day Adventist, and one Christian Science. The educational institutions are the public and parish schools, Saint Joseph's Seminary, a Conservatory of Music, and in Bourbons Grove, a suburb of the city, Saint Viateur's College, and Notre Dame Academy. It

has the Illinois Eastern Hospital for Insane and the Emergency Hospital, a public library, the Y. M. C. A. building, and the city buildings. There are two national banks and two savings banks with a combined capital of \$300,000. The government is vested in a mayor, who holds office two years, and a council of 10 members, one half of whom are elected each year. The council elects the administrative officials and the health and local improvement boards. Pop. (1890) 9,025; (1900) 13,595.

Kankakee, a river of northern Illinois, which has its rise in the northern part of Indiana, flows west and southwest and enters Kankakee County in Illinois. From where it receives the waters of the Iroquois from the south, the course changes to the northwest until it enters Grundy County, where it unites with the Des Plaines River and forms the Illinois.

Kano, kä-nō', in the province of Sokoto, in West Africa, the chief town of the extensive Sudanese sultanate annexed by Great Britain in 1903. Kano is the point of convergence of many caravan routes and is the principal market and centre of trade in the interior of Africa. Leather and cotton goods are extensively manufactured and dyeing is carried on. On account of its industries Kano has been called the Manchester and Birmingham combined of the Dark Continent. The annual attendance of the market at Kano exceeds 1,000,000 persons from all parts of Africa; Morrell estimates the attendance as twice as large. The market is held daily throughout the year and is believed to have existed at this place for over 1,000 years. Sign language is largely used by the heterogeneous crowd in making bargains. In addition to native wares and produce, such as ivory and ostrich feathers, European merchandise and ammunition are on sale. The objectionable feature of the market is the trade in slaves, a characteristic that will doubtless disappear under British rule. The wall surrounding Kano is reported to be 16 miles in circumference. The houses are chiefly of adobe and the streets are wide and clean. Kano was captured by the British in 1903. Pop. (estimated 1892) 120,000. See also SOKOTO.

Kansas, one of the great States of the Middle West, the 21st to be admitted into the Union, and a centre of human activity and achievement from its beginning. In less than 50 years a vast commonwealth has been erected, exceeding in population and resources many of the older States. The historian, George Bancroft, designated Kansas as "the miracle of the age." The name is derived from the Indian word "Kanza," having the dual significance of "wind" and "swift." In popular nomenclature Kansas is known as "the Sunflower State." Its State motto is *Ad Astra per Aspera* — "through difficulties to the stars." The State is situated in lat. 37° to 40° N., lon. 94° 40' to 102° W.; bounded on the north by Nebraska, on the northeast and east by Missouri, on the south by Oklahoma and Indian Territories, and on the west by Colorado.

Early History.—The territory forming the present State of Kansas was a part of the Louisiana Purchase of 1803, except a fraction in the southwest corner acquired from Texas in 1850. It is claimed that Coronado visited the country as early as 1541, and there are evidences

KANSAS

of French and Spanish expeditions in later years. The Lewis and Clark Expedition, planned by President Jefferson, reached Kansas in June 1804, and, two years later, the expedition commanded by Zebulon Montgomery Pike, who gave his name to "Pike's Peak," crossed the territory from the Missouri River to the Rocky Mountains. The expedition of Major Stephen H. Long was made in 1819, and in 1824 was established the "Santa Fe Trail," the famous highway of Kansas, extending 400 miles directly across the Territory, and from Independence, Mo., to Santa Fe, a distance of 780 miles.

This was the beginning of the development and growth of Kansas. The outposts of civilization were being extended westward from the Mississippi River. The Indians of Missouri and other Mississippi Valley States were concentrated with the tribes already occupying the country west of the Missouri River. These included the Osage, Shawnee, Pawnee, Delaware, Kickapoo, and Kansas tribes, to which were added the Cherokee and other tribes from the States of the south, the Ottawas, Pottawatomies, Wyandottes and others from Ohio, Michigan and Indiana. Kansas became Indian Territory, and remained such from 1830 to 1854. Occupation of the country by white settlers was fraught with peril and hardship, and only accomplished by marvelous heroism, perseverance and endurance. To aid in the work of civilization missions were established on the frontier, and military posts located at Fort Leavenworth, Fort Scott and Fort Riley.

Territorial Days.—The admission of Kansas as an organized Territory dates from 30 May 1854, when President Pierce signed the Kansas-Nebraska Act. This brought on what may be termed the political troubles of Kansas, and later, as a result of the slavery agitation, precipitated the great armed conflict between the North and the South in 1861-5. It was on Kansas soil that the first battle was fought for the freedom of the negro, and it was Kansas that developed the heroic figure of John Brown. From the time Congress took the first step for the admission of Kansas, with or without slavery, the Territory became the scene of contention, pillage and bloodshed. The pro-slavery men of Missouri endeavored to gain control of the Territory in 1854, and established the first city, Leavenworth. Soon afterward an anti-slavery colony from Massachusetts settled at Lawrence. No more hostile factions ever struggled for supremacy on this continent.

Andrew H. Reeder, of Pennsylvania, was appointed to be the first governor of the Territory. At the first contest for territorial delegate to Congress the slavery men of Missouri crossed the river and participated in the election, the candidate of the pro-slavery party being successful by reason of these illegal votes. The Free-soilers protested and held indignation meetings at Lawrence and other points. The Missourians repeated the same tactics at the election in the spring of 1855 for representatives to the legislature. When the legislature met at Pawnee the pro-slavery members were in the majority, and controlled the proceedings, even to the extent of driving out the Free-soil members and changing the seat of government.

The Free-soil party repudiated the acts of the legislature and refused to abide by them.

Governor Reeder was removed from office and succeeded by Wilson Shannon, of Ohio. John W. Whitfield was elected delegate to Congress by the pro-slavery party, and Ex-Governor Reeder chosen to the same position by the opposition, but Congress refused to give either delegate a seat. A Free-soil constitution was adopted in December 1855, under which Charles Robinson was elected governor, but the election was repudiated by President Pierce, who had recognized the "bogus" legislature. The Free-soil legislature ignored the action of President Pierce, and, to meet this and other menacing circumstances, the military forces of the United States government were placed in command of Governor Shannon. Governor Robinson and Congressman-elect Reeder were indicted for high treason. The pro-slavery party received large accessions from Georgia, Alabama and South Carolina. In the troubles resulting from this conflict of authority the Emigrant Aid Society Hotel and the "Herald of Freedom" and "Kansas Free State" printing offices at Lawrence were destroyed, and the town of Osawatomie—the home of John Brown—was sacked and burned.

Struggles for Statehood.—A bill for the admission of Kansas as a State was passed by the lower house of Congress in June 1856, but was defeated in the Senate on account of the recognition it gave to the Free-soil constitution. A meeting of the Free-soil legislature in Topeka was dispersed by United States troops acting under orders from President Pierce. By this time the interest in the Kansas struggle became general throughout the United States. The suppression of slavery became a national instead of a state issue. While Congress debated and legislated, the pro-slavery and free-state factions continued to war against each other for possession of the Territory and control of the law-making machinery. Conflicting constitutions were adopted, rival legislatures elected, and civil government overthrown. Public meetings were held in all parts of the North to lend encouragement to the movement for making Kansas a free State. Similar sympathy and help came to the pro-slavery party from the States of the South. Horace Greeley and Abraham Lincoln visited the Territory, and made speeches in opposition to the further extension of slavery on American soil. Governor Shannon was removed from office, and the several governors appointed to succeed him found the duties of the position so onerous that they resigned in rapid succession.

After numerous battles, elections and vicissitudes, a constitutional convention was called to meet at Wyandotte 5 July 1859. It was composed of 35 Free-state and 17 pro-slavery delegates, who were now known as Republicans and Democrats, respectively. Under the constitution adopted by this convention slavery was prohibited and Kansas admitted as a State 29 Jan. 1861. The seat of government was located at Topeka. At the election held in December 1859, under the Wyandotte constitution, Charles Robinson was chosen to be the first governor of the State, and Martin F. Conway the first representative in Congress. When the first State legislature assembled at Topeka in March 1861 James H. Lane and Samuel C. Pomeroy were elected the first two United States senators from the new State.

KANSAS

In the civil war which followed the inauguration of President Lincoln in 1861, Kansas showed its loyalty to the Union by furnishing 20,000 trained soldiers out of a total population of but little more than 100,000—a number greatly in excess of her quota, none of them drafted, and in proportion exceeding the enlistments from any other State. A large part of this force was employed in defending the borders of the State from invasion by southern troops, Indians and guerrillas. During one of these border raids a force of 400 men under command of Quantrell invaded Lawrence, burning and pillaging the town and killing 150 defenseless citizens. The war and the troubles with the Indians, together with a visitation of drought in 1860, greatly retarded the growth of Kansas, but when these obstacles were passed an era of progress and development set in which has never since abated. The splendid soil and auspicious climate and the general adaptability of the State to farming and stock-raising purposes have attracted thousands of settlers to the State, and the advancement in all lines has been rapid, substantial and permanent.

Governors—(Territorial) Andrew H. Reeder (1854 to 1855), Wilson Shannon (1855 to 1856), John W. Geary (1856 to 1857), Robert J. Walker (1857), James W. Denver (1858), Samuel Medary (1858 to 1860). (*State*) Charles Robinson (1861-3), Thomas Carney (1863-5), Samuel J. Crawford (1865-8), Nehemiah Green (1868), to fill the unexpired term of Samuel J. Crawford, resigned; James M. Harvey (1860-73), Thomas A. Osborn (1873-7), George T. Anthony (1877-9), John P. St. John (1879-83), George W. Glick (1883-5), John A. Martin (1885-9), Lyman U. Humphrey (1889-93), Lorenzo D. Lewelling (1893-5), Edmund N. Morrill (1895-7), John W. Leedy (1897-9), William E. Stanley (1890-1903), Willis J. Bailey (1903—). During the official interruptions incident to the territorial period the following persons served terms as acting governor: Daniel Woodson, Frederick P. Stanton, James W. Denver, Hugh S. Walsh, George M. Beebe.

United States Senators.—James H. Lane (1861-6), Samuel C. Pomeroy (1861-73), Edmund G. Ross (1866-71), Alexander Caldwell (1871-3), Robert Crozier (1873-4), James M. Harvey (1874-7), John J. Ingalls (1873-91), Preston B. Plumb (1877-91), William A. Peffer (1891-7), Bishop W. Perkins (1892-3), John Martin (1893-5), Lucien Baker (1895-01), William A. Harris (1897-03), Joseph R. Burton (1901), term expires 1907; Chester I. Long (1903), term expires 1909.

Government.—The State legislature consists of 40 senators and 125 representatives. Sessions are held biennially, in odd-numbered years. The legislature of 1903 was divided politically as follows: Senate, 34 Republicans, 6 Democrats and Populists; house, 95 Republicans, 30 Democrats and Populists; Republican majority on joint ballot, 129. The elective State officers include governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, State superintendent of public instruction, commissioner of insurance, 7 justices of the supreme court, and 3 members of the State board of railroad commissioners. Kansas has 8 representatives in the lower house of Congress, of which 7 are chosen by districts and 1

at large. Women have the right of suffrage at municipal, bond and school elections. They have been elected to municipal and school offices, and in some cases to county offices.

Population.—The local census of 1855 gave Kansas a population of 8,501; this increased in 1860 to 107,206; in 1870 to 364,399; in 1880 to 396,069; in 1890 to 1,427,096; in 1900 to 1,470,495. The present population of the State, according to the local census of 1903, is 1,487,847. Population by counties follows:

COUNTY	Pop.	COUNTY	Pop.
Allen	26,468	Linn	15,534
Anderson	13,630	Logan	2,127
Atchison	30,369	Lyon	25,944
Barber	6,698	Marion	21,455
Barton	13,518	Marshall	23,851
Bourbon	26,324	McPherson	20,772
Brown	20,921	Meade	1,592
Butler	22,262	Miami	20,254
Chase	7,434	Mitchell	13,034
Chautauqua	11,779	Montgomery	33,473
Cherokee	36,381	Morris	11,704
Cheyenne	2,709	Morton	246
Clark	1,734	Nemaha	20,258
Clay	15,317	Neosho	22,253
Cloud	17,453	Ness	4,976
Coffey	15,582	Norton	10,564
Comanche	1,671	Osage	22,371
Cowley	31,779	Osborne	11,283
Crawford	42,198	Ottawa	10,479
Decatur	8,521	Pawnee	5,706
Dickinson	22,235	Phillips	13,196
Doniphan	15,007	Pottawatomie	17,279
Douglas	25,400	Pratt	7,766
Edwards	4,797	Rawlins	5,040
Elk	10,502	Reno	29,142
Ellis	10,454	Republic	16,457
Ellsworth	9,059	Rice	13,746
Finnerty	3,273	Riley	13,738
Ford	6,531	Rooks	8,274
Franklin	21,593	Rush	6,470
Geary	10,843	Russell	8,377
Gove	2,870	Saline	18,249
Graham	6,119	Scott	1,320
Grant	394	Sedgwick	51,175
Gray	1,543	Seward	824
Greeley	575	Shawnee	57,060
Greenwood	16,037	Sheridan	4,083
Hamilton	1,517	Sherman	3,416
Harper	11,290	Smith	15,077
Harvey	17,594	Stafford	10,033
Haskell	504	Stanton	349
Hodgeman	2,518	Stevens	670
Jackson	15,598	Sumner	25,636
Jefferson	20,164	Thomas	3,916
Jewell	16,233	Trego	3,091
Johnson	16,840	Wabaunsee	12,391
Kearny	1,158	Wallace	1,073
Kingman	11,211	Washington	20,594
Kiowa	3,039	Wichita	1,229
Labette	29,183	Wilson	16,286
Lane	1,946	Woodson	10,072
Leavenworth	41,044	Wyandotte	74,267
Lincoln	9,849		

There are 118 cities and towns having a population of 1,000 or more. The 10 largest cities and their population are: Kansas City, 59,919; Topeka, 38,959; Wichita, 31,549; Leavenworth, 22,991; Atchison, 16,617; Fort Scott, 13,707; Pittsburg 13,116; Lawrence, 11,726; Hutchinson, 10,668; Parsons, 10,066.

Topography.—Although a part of the great plains which form the eastern slope of the Rocky Mountains, the physical character of the Kansas country is best described as rolling prairie. There are no mountains, and no marshes. The altitude varies from 750 feet in the eastern to 4,000 feet in the western part of the State. The bulk of the land is tillable, but crops are uncertain in the western third of the State on account of deficient rainfall. In this deficient area the vast stretches of prairie are largely used for grazing purposes. The rivers are the Kansas, Arkansas, Republican, Smoky

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Hill, Solomon, Saline, Neosho and Verdigris — none of them navigable. There are numerous smaller streams, giving abundant water and drainage in the eastern two-thirds of the State. The land area comprises 82,080 square miles (52,531,200 acres), extending 408 miles from east to west, and 208 miles from north to south.

Climate.—The climate is mild, the great proportion of the days being fair and sunny. In summer the temperature ranges from 80° to 100°, with cool nights, and dry, pure air. In winter it rarely falls below zero. The violent winds of winter and spring, known to the early settlers, have been greatly mitigated by the cultivation of the soil and the planting of trees.

Agriculture and Stock-raising.—Fully 40 per cent (20,000,000 acres) of the farm land of Kansas is in a high state of cultivation. The cultivated farms have an aggregate value of \$600,000,000. The acreage in field crops in 1902 was exceeded only by Iowa. The following table shows the acreage, quantities and values of farm products for the year 1902:

growth of nursery stock. The number of apple trees in bearing in 1902 was 7,295,415; peach trees, 4,062,463; cherry trees, 852,268; plum trees, 641,977; pear trees, 247,515; number of acres in nurseries, small fruits and vineyards, 13,226.

Manufactures.—The natural material for manufacturing is limited. There are no timber lands of consequence, and no deposits of iron. Manufacturing, therefore, is confined to the conversion of farm products into marketable commodities, such as flour and meat, and these industries are important and extensive. Including the large plants at Kansas City, Kan., the slaughtering and meat packing business of the State for the year 1900 amounted in value to \$77,411,883. The flouring and grist mill products for the same year aggregated a value of \$21,926,768. Other manufacturing interests for the same year amounted to the following sums: Car construction and railroad shop work, \$6,816,816; zinc smelting and refining, \$5,790,144; foundry and machine shop products,

CROPS	Acres	Quantities	Values
Winter wheat	6,254,747	54,323,839	\$28,983,943.60
Spring wheat	46,293	325,397	155,546.57
Corn	6,990,764	201,307,102	78,321,653.26
Oats	1,023,171	32,966,114	9,504,254.35
Rye	338,358	3,728,296	1,584,321.31
Barley	154,665	2,188,973	801,381.69
Buckwheat	387	2,770	2,216.00
Irish potatoes	60,618	8,193,632	3,136,856.71
Sweet potatoes	4,517	539,879	334,487.41
Castor-beans	557	4,400	5,500.00
Cotton	486	136,005	9,520.35
Flax	263,962	1,427,975	1,713,570.00
Hemp	51	10,200	610.00
Tobacco	1bs.	98	1,515.00
Broom-corn	1bs.	43,893	16,584,205
Millet and hungarian.....	tons	174,933	400,160
Sorghum: For syrup or sugar.....	gals.	20,411	1,792,200
For forage or grain.....		540,855	663,114.00
Milo maize	tons	5,839	16,514
Kafir-corn	tons	748,176	2,824,624
Jerusalem corn	tons	3,021	7,989
Timothy	tons	319,836	
Clover	tons	109,172	
Blue-grass	tons	268,873	803,934
Alfalfa	tons	458,493	
Orchard-grass	tons	2,832	
Other tame grasses.....	tons	91,038	
Prairie-grass under fence.....	tons	7,953,809	820,637
Totals.....	25,879,855		\$148,064,391.40
Animals slaughtered or sold for slaughter.....			\$51,346,589.00
Poultry and eggs sold.....			5,706,352.00
Wool clip	lbs.	647,427	97,114.05
Cheese	lbs.	3,025,655	302,565.50
Butter	lbs.	44,350,829	7,517,331.65
Milk sold			725,380.00
Garden products marketed.....			653,975.00
Horticultural products marketed.....			1,187,473.00
Wood marketed			186,150.00
Wine manufactured	gals.	205,470	154,102.50
Honey and beeswax.....	lbs.	450,389	60,631.20
Total.....			\$67,937,663.90
Total value all farm products.....			\$216,002,055.30

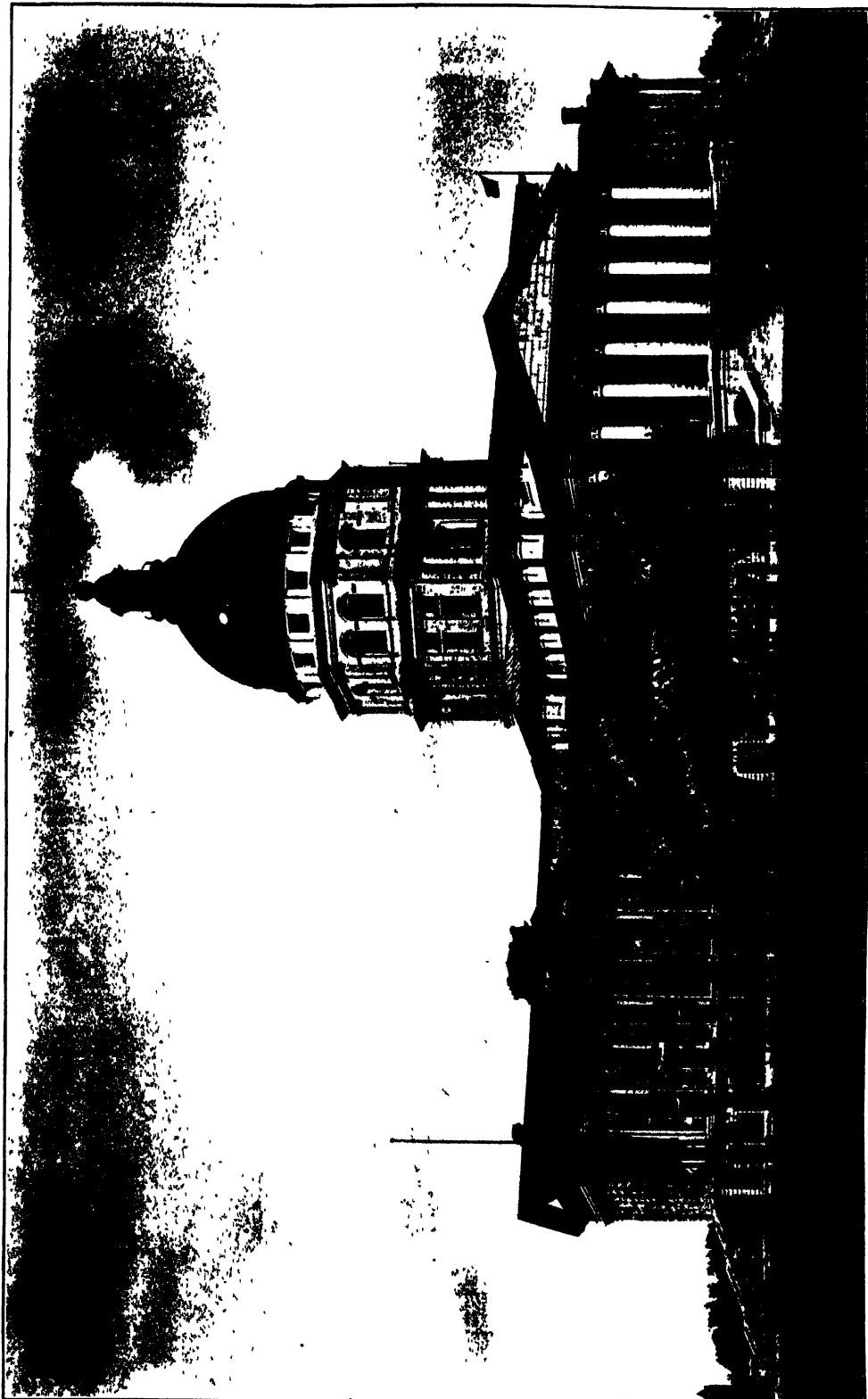
The numbers and values of live stock for the same year were: Horses, 811,504 — \$51,130,422; mules and asses, 95,671 — \$6,606,970; milch cows, 791,844 — \$23,755,320; other cattle, 2,555,800 — \$61,339,200; sheep, 136,753 — \$410,259; swine, 1,427,302 — \$11,775,241; total value, \$155,107,412.

Kansas ranks well in the production of fruit and is surpassed by but few States in the

\$3,652,530. The total value of the products enumerated was \$118,402,400, covering the work of 860 establishments and 18,288 employees.

Mineral Resources.—These consist principally of coal, zinc, lead, natural gas, petroleum, cement and gypsum. With the exception of the three last-named commodities the mining industry is chiefly located in the southeast corner of the State, embracing the counties of Cherokee,

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CAPITOL AT TOPEKA.

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Crawford, Labette, Bourbon, Montgomery, Chautauqua, Neosho and Allen. Cherokee leads in coal, lead and zinc; Crawford is second in coal, Allen is first in natural gas, and Neosho first in petroleum. Extensive mines of coal are also found in Osage and Leavenworth counties. Reno and Kingman counties have the principal salt mines. Building stone of excellent quality is found in various parts of the State. Underlying the surface of Kansas are the three common formations known as the Carboniferous, Triassic and Cretaceous systems, running from north to south, and dividing the State into three belts of nearly equal extent. In the year 1900 the value of the mineral products of Kansas were: Coal, \$5,516,534; zinc, \$3,000,000; salt, \$1,675,000; clay, \$975,500; stone, \$714,750; natural gas, \$695,000; cement, \$669,685; oil, \$355,118; lead, \$324,859; gypsum, \$267,500; total, \$14,193,946.

Railroads.—The total mileage of railway tracks operated in Kansas is 10,483. The prominent lines and systems are: Atchison, Topeka & Santa Fe; Chicago, Rock Island & Pacific; Union Pacific; Missouri Pacific; Missouri, Kansas & Texas; Saint Louis & San Francisco. The gross earnings of all Kansas railroads for the year 1902 were \$28,000,000.

Banking.—There are 502 State and private banks in Kansas, with a total paid capital of \$8,156,500, and deposits of \$47,690,056.14. The 146 national banks have a paid capital of \$9,936,400, and deposits of \$50,973,729; making a total capital of \$18,092,900, and total deposits of \$98,663,785.14, these figures being for the year 1903. Of the total deposits it is estimated that 68 per cent is owned by farmers and stockmen.

Education.—Kansas spends more than \$5,000,000 annually in the support of public schools. The school population is 500,000, the enrolment 390,000, and the average attendance 265,000. Number of teachers employed, 11,698. The percentage of illiteracy in the State is very low, being less than 3 per cent. The colleges in the State are: Baker University, Baldwin; Bethany, Lindsborg; Campbell University, Holton; Highland University, Highland; Kansas Wesleyan University, Salina; McPherson, McPherson; Midland, Atchison; Ottawa University, Ottawa; Southwest Kansas, Winfield; Saint Benedict's, Atchison; Saint John's, Salina; Saint Mary's, Saint Marys; State Agricultural, Manhattan; State Normal, Emporia; State University, Lawrence; Sisters of Bethany, Topeka; Washburn, Topeka.

Religion.—All of the religious denominations are represented, the Methodist being the largest numerically, followed in order by the Roman Catholic, Baptist, Disciples, Presbyterian, United Brethren, Congregational, Lutheran, Friends, African M. E., and Evangelical Association. The moral standard of the population is very high, Kansas being one of the few States that has adopted an amendment to its constitution prohibiting the manufacture and sale of liquor.

Newspapers and Libraries.—Kansas has 837 newspapers, including 51 dailies, 634 weeklies, 4 semi-weeklies, 116 monthlies, 14 semi-monthlies, 2 bi-monthlies, 11 quarterlies, and 5 occasionals. Of public, college and high school

libraries there are 112, with a total of 525,519 volumes.

Charitable and Penal Institutions.—The institutions of this class, and the numbers of inmates of each, are: Insane asylum, Osawatomie (990); Insane asylum, Topeka (780); Insane asylum, Parsons (430); Blind asylum, Kansas City (93); Imbecile school, Winfield (210); Deaf and Dumb school, Olathe (263); Soldiers' Orphans' home, Atchison (150); Soldiers' home, Dodge City (146); State penitentiary, Lansing (1,020); Industrial reformatory, Hutchinson (260); Industrial school, girls, Beloit (125); Reform school, boys, Topeka (209). The Federal government maintains a military prison and a branch of the national soldiers' home at Leavenworth.

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JANUS L. KING,
Kansas State Librarian.

Kansas, a river in the State of Kansas, formed in Geary County by the junction of the Smoky Hill and Republican rivers. The direction of its course is mainly east; but it makes one gradual curve toward the north between Junction City, at the source, and Topeka. After a course of about 250 miles through a rich agricultural region, the river flows into the Missouri at Kansas City. The largest tributary is the Little Blue River from the north. Several small tributaries enter the Kansas from the south.

Kansas, University of, a State educational institution, situated at Lawrence, Kan. The establishment of a State university was provided for in the State constitution, and an act of the legislature incorporated the university in 1863. In 1865 a preparatory department was opened, and in 1866 one building was erected and the collegiate department established; in 1891 the preparatory department was discontinued. The present organization includes the school of arts, with classical and literary courses leading to the degree of A.B.; the school of engineering conferring the degree of B.S.; the graduate school giving advanced courses in arts and engineering; the school of law; the school of fine arts, offering courses in music, painting and elocution; the school of pharmacy; the school of medicine, offering the first two years of a regular four year medical course; and the summer session of six weeks. The university is the head of the State's public school system, and is in

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direct connection with the high schools, admitting those who have completed the high school course, or a similar course, without examination; no tuition is charged to residents of Kansas, and the university is open to both men and women; non-residents pay a small fee. The library in 1903 contained 40,840 volumes and a large number of pamphlets; \$7,000 are annually appropriated for the purchase of books; the natural history museum contains over 250,000 specimens. In 1903 the State appropriated \$50,000 for a building for the law school. Number of students (1903) 1,294; number of professors and instructors, 81.

Kansas City, Kan., city, county-seat of Wyandotte County; on the Kansas and Missouri rivers, and on the Union P., the Missouri P., the Chicago R. I. & P., the Chicago G. W., and the Atchison, T. & S. F. R.R.'s. Branches of other railroads enter the city and the nearby towns are connected by electric-trolley lines. Kansas City, Mo., opposite and east is one with Kansas City, Kan., in commercial development, but each has an independent municipal organization. A large number of bridges connect the two cities. In one part of the city, west of the Kansas River and south of the Missouri, the dividing line between the two cities is a street.

Kansas City is the largest city (1904) in the State. It was formerly known as Wyandotte, later as Kansas City, Kan., then, in 1886 the municipalities of Armourdale, Armstrong, Wyandotte, and Kansas City, united under the name of Kansas City. The area is 10½ square miles. A portion of the city is built on the river bottoms, and many fine public and private buildings are on the high bluffs and extend back on the level land. The city is on both sides of the Kansas River, so the boundary line between the States of Missouri and Kansas is in part the boundary line between the twin cities. It is noted for its live-stock and meat-packing industries; but the second largest live-stock-interest establishments in the country are on the boundary dividing the two cities. Some of its other chief industrial establishments are railroad car shops, machine shops, grain elevators, smelters, iron and steel works, flour mills, soap and candle factories, box and barrel factories, foundries, wholesale grocery houses, slaughter yards, lumber and brick yards. The slaughtering and meat packing industries have a capital of \$15,000,000. In the State, in 1902, the value of the meat packing industries was \$77,411,883, nearly all of which was the output of the Kansas City establishments. The manufacturing products of the city represented, in 1902, about \$85,000,000. The city is the seat of Kansas City University, established in 1896 by the Methodist-Protestants; the State Institution for the Blind; College of Medicine and Surgery; Saint Margaret's and Bethany hospitals; and Carnegie Library. It has fine public parks, a magnificent high school and excellent public and parish schools. In August 1902 the city was visited by a severe storm and over 200 houses were destroyed, and a large number of public and private buildings were injured. Pop. (1890) 38,316; (1900) 51,418.

Kansas City, Mo., the second city in the State of Missouri and the 22d in population in the United States, it is located in the north-western part of Jackson County in the angle

formed by the Kansas River at its junction with the Missouri. At the intersection of 14th and Washington streets, the latitude is 39° north and the longitude is 94° 36' 16.18" west. The name is derived from an Indian tribe that formerly occupied and owned much of this section of the country and their title to which was extinguished in 1808, excepting a narrow strip of land 24 miles wide lying eastward of the State line from Fort Clarke, later known as Fort Osage, and extending southward to the Arkansas River. The Indians relinquished their title to this strip of land in 1825, and in it lies nearly all of Jackson County.

History.—Trading posts had been established at different points along the Missouri River from 1765 to 1799 as far upward as what is now St. Joseph, by the adventurous French trappers and traders who first explored much of this western country. The settlers who had been checked at the eastern limit of the Kansas Indian Reservation made a general rush into the newly acquired purchase. In 1826 a census was taken with the view of forming a county organization which was effected 15 December in the same year. Prior to this date, however, Daniel Morgan Boone, third son of Col. Daniel Boone, the noted pioneer, came from Kentucky in 1787 to St. Louis, where he made his home for 12 years, residing there during the summers, but in winters hunting and trapping beaver chiefly on the Big and Little Blue, in Jackson County, which he declared to be the best beaver country known. However, it was reserved for Lewis and Clarke to give the first distinct account of the country at the mouth of the Kansas River and this record made by them, is dated 26 June 1804. In 1800 Louis Barthelot, known in the early history as Grand Louis, moved from St. Charles, Mo., and settled at the mouth of the Kansas River; his wife being the first white woman to have a home on the present site of Kansas City. In 1821, Francis Chouteau established a camp opposite Randolph Bluffs. A flood in 1826 destroyed his trading post where he had made the first permanent white settlement within the corporate limits of Kansas City. These settlers were trappers, traders, laborers, and voyagers with their families. What is now the busiest part of Kansas City was called at first Westport Landing. The town of Westport was platted in 1833, and lies about four miles south of the landing on the Missouri River. Kansas City proper, that is, 250 acres of land, was laid out in town blocks and lots in 1838, but owing to a disagreement among the stockholders the project was abandoned till 1846, when a new company was formed who advertised and sold 150 lots. The town began to grow and soon had 600 inhabitants. At this time the chief agency in building up the new town was the trade with the Indians and with New Mexico. Within the short space of five years the town enjoyed almost exclusively the entire trade of New Mexico that came east to the Missouri River. This traffic was along what was known as the "Santa Fe Trail" (q.v.), a highway, extending at first from Franklin, Mo., on the Missouri River, to Sante Fe, New Mexico. Outside of these French settlers who had established themselves in the vicinity of what is now Kansas City, was James H. McGee, who came here in 1828, and whose family was prominently identified with the early history and de-

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velopment of this part of Missouri. There was not a sufficient infusion of the American spirit, however, for a number of years materially to affect the character of the early French traders who gave their attention to the extensive fur trade with the Indians as far west as the Rocky Mountains. Prior to 1828, the only means of crossing the Missouri River at this point was by canoes, but this year a ferry was established, so that the few settlers could cross the river to take their corn to a horse-mill on the north side of the river.

Topography.—The original site of Kansas City presented a rugged, precipitous and uninviting aspect,—high bluffs composed chiefly of limestone, facing the Kansas River as it sweeps in from the southwest, thence veering west of north till it empties into the Missouri River,—thence continuing along the south bank of the Missouri River four miles to the valley of the Big Blue. Through these high bluffs cut by deep ravines, in some places 200 feet deep, ran streams into the river. These gorges were the channels through which the water that fell on the upland, flowed into the Missouri. Towering upward from the two rivers, stood the precipitous bluffs with but a few hundred feet in width of bottom land on which to begin a city. Just below where the Kansas River empties into the Missouri, the bluffs for a mile or more were composed chiefly of a rich loam which has been shaved down to a moderate grade and the dirt made into brick. Owing to the changable nature of the Missouri River in cutting through the bottom land on either side of it, the town had to be built between the river and the bluffs, along the deep ravines, and on the hills. Persons who see the city as it is now, can scarcely realize the obstructions that had to be removed in grading down streets to a level and in filling cuts. The city is topographically divided into three parts, known locally as the Hills, including all that part of the town on the highlands, extending east and south into level upland which is of great beauty; West Kansas City, including the lowlands lying between the State line on the west and the east bluff of the Kansas River, and the East Bottom which takes in all the lowland lying east of the foot of Grand Avenue where it runs to the Missouri River, were originally covered with dense forests, as indeed was the entire town site, and it was not till after the Civil War that the timber was cut off the West Bottom; since then it has become the busiest part of Kansas City in which are located the stock yards, elevators, the most of the passenger and local freight depots, and a large part of the wholesale business houses of the city. From its earliest history as Westport Landing, Kansas City was noted for its steamboat traffic. It had one of the most permanent landings on the river,—a rocky bank with a deep current in front of it. Here were landed the goods for the Mexican and Indian trade West and Southwest, and in exchange were received the wool, furs, buffalo robes, and other articles for the eastern markets. The location of the city at the most southern bend eastward in the Missouri River, even before the age of continental railroads, was the natural route through which the Santa Fe and the Indian trade of the West and Southwest must pass to be exchanged for the products these people desired.

Commerce.—The men who have contributed so much toward making Kansas City the metropolis of the Missouri Valley turned their attention to the grain and produce market of this vast region thirty years ago. From an insignificant local trade in 1871 of a few hundred thousand bushels of grain handled that year, the business has grown now to 50,000,000 bushels annually. In 1902 there were received 24,018,400 bushels of wheat, 16,092,800 bushels of corn, 8,358,000 bushels of oats, 376,800 bushels of rye, 33,000 bushels of barley, 99,200 bushels of flax-seed, 15,060 tons of bran, and 146,320 tons of hay, while the export of grain was 36,206,400 bushels. In the elevators and mills the storage capacity is 6,320,000 bushels, and the handling capacity,—1,518,000 bushels, while the total mill products aggregate 1,692,854 barrels. The numerous grain elevators enable the railroads to handle and transport grain to other points with facility and despatch. Its title as the “greatest winter wheat market”, is known in foreign countries to which millions of bushels of Kansas, Nebraska, Missouri, and Oklahoma grain are annually shipped by Kansas City exporters. It is not alone as a centre for the accumulation of wheat, corn, and oats that it is famous, but also as a distributing point for cereals to be consumed in the south, east, and in foreign markets. The flour and meal manufactured by the half dozen local mills also go abroad in large quantities, as well as to many parts of the United States. The milling business is one of the rapidly growing industries. Enormous capital is involved in the transaction of the grain business. In elevators alone the investments run into millions of dollars. The growth of this market since its inception in 1871 has been marked by a uniform and rapid progress until it is one of the most important grain markets in the United States. Kansas City's bank clearings are more than \$1,000,000,000 annually, and the deposits exceed \$70,000,000 in 19 different banks, having a paid up capital of \$6,000,000. At present Kansas City occupies the second position in the world as the leading live stock market. The stock yards are the most convenient for the quick and safe handling of stock in the United States. The aggregate value of live stock handled last year was \$126,250,000. The packings houses are eight in number, having a combined capacity for daily slaughter of 12,300 steers, 34,500 hogs, and 14,200 sheep. These products are marketed in every civilized country. The stock yards cover 200 acres, containing 1200 cattle pens, 625 hog pens, and 100 sheep pens. The receipts of cattle at the stock yards in 1902 were 2,279,166; hogs 217,937; sheep 15,4084; horses and mules 768,448; shipped in 730 cars. The cost of the packing plants is estimated at \$12,000,000, and the number of hands employed approximate 1,000; while the annual value of the outputs is over \$150,000,000. In 1902 the wholesale trade of Kansas City exceeded \$100,000,000, and the retail trade \$45,000,000. Seventy firms did a business of \$16,000,000 in agricultural implements. The geographical location of Kansas City with respect to other centres of trade is represented as follows: distance to St. Louis 229 miles, Chicago 612 miles, Cincinnati 660 miles, Omaha 200 miles, St. Joseph 200 miles, St. Paul 500 miles, Minneapolis 200 miles, Albany 1,260 miles, Buffalo 200 miles, Boston

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1,459 miles, New York 1,303 miles, Philadelphia 1,213 miles, Washington 1,267 miles, Pittsburg 896 miles, Atlanta 902 miles, Galveston 962 miles, New Orleans 942 miles, Denver 633 miles, Los Angeles 1,805 miles, San Francisco 2,093 miles, Portland, Ore., 2,050 miles.

Railroads.—Twenty different railroad systems enter the city, operating 33 different lines, representing more than 50,000 miles in length. The magnitude of this business may be inferred from the fact that 200 passenger trains arrive and depart daily from the depots, while 350 freight trains come into and go out of the freight yards, thus rendering Kansas City one of the greatest and most important transfer and distributing points on the continent, as well as one of the greatest express centres. Two railroad bridges span the Missouri River and a third is in process of construction. In telegraphic communication Kansas City is only surpassed by New York and Chicago in the number of wires entering the city and in the volume of business transacted.

Manufactures.—It has only been of recent years that manufacturing industries have sprung up along various lines in Kansas City. The energies of the business men were directed for two decades after the close of the Civil War to the live stock and agricultural trade, and in supplying the farmers with agricultural implements. Owing to the great deposits of bituminous coal in this vicinity and the abundance of raw material out of which so many products can be economically and rapidly manufactured, new industries are springing up each year. There are more than 600 factories in operation, employing 30,000 hands, who make \$200,000,000 worth of merchandise annually. The minor manufactures represent an invested capital of \$26,437,307, and output of \$36,527,392, employing more than 16,000 persons.

Government.—At the head of the city government is the mayor, whose term of service is two years, upper house of aldermen, consisting of 14 members, whose term of service is four years, elected at large; lower house councilmen, 14 members, term of service two years; city treasurer, auditor, police judge, and city attorney, elected biennially. The other officers are nominated by the mayor and confirmed by the upper house. The board of park commissioners, the chief of the fire department, engineer, city physician, superintendent of buildings, superintendent of streets, plumbing inspector, superintendent of workhouse, etc., are appointed by the mayor and confirmed by the upper house. The board of police commissioners is composed of three members, the mayor, and two citizens appointed by the governor.

Public Service.—The assessed valuation of property is \$93,260,070, an increase of more than \$30,000,000 since 1893, and this valuation represents about one fourth of the cash value. The municipal indebtedness of the city is \$5,331,900.00, the greater part of which is for the water-works plant. The city is also the owner of much valuable property, including the city hall, hospital, the workhouse grounds, and parks. The comptroller's last report shows the expenditures for operating expenses of the several departments: Officers and employees, \$99,000.00; police department, \$280,000.00; fire and fire patrol, \$249,000.00; hospital and board of health,

\$35,000.00; workhouse, \$17,000.00; printing and stationery, \$18,000.00; board of public works, \$200,000.00; gas and street lighting, \$100,000.00; parks, \$48,000.00; garbage, \$20,000.00; expense, \$56,000.00; water department, \$453,409.00. The city purchased the waterworks in 1895. The water used is obtained from the Missouri River at Quindaro, a pumping station eight miles up the river. During 1902 there were 19 miles, 1,667 feet of water mains laid, and 283 fire hydrants placed. The street railway service, which permeates all parts of the city, connects with suburban trolley lines, reaching Independence, Leavenworth and intermediate stations, and affords a means of rapid transit for a quarter of a million of people at a nominal expense. The revenue to support the municipal government is derived from taxes levied annually on personal and real property, and the annual tax levy is about 12½ miles on the dollar's valuation. The city has an area of 26.3 square miles, with 452 miles of streets, of which 117.55 miles are paved with asphalt, 39.65 miles with vitrified brick, 2.24 miles with stone blocks, and 39.17 miles with macadam.

Population.—The following figures show the steady progress with which year by year Kansas City has advanced to her proud position as the largest and most important city in the Missouri Valley. The population in 1838 was 300. (1846), 700; (1857), 2,000; (1860), 4,418. (1870), 32,200; (1880), 55,785; (1890), 132,710. (1900), 163,750. The death rate is exceedingly low, being 12.84 of every 1,000 inhabitants.

Religion.—In 1825 the Jesuit fathers organized a mission near the mouth of the Kansas River, and built a small log house near the foot of what is now Troost Avenue, just below the bluff, where they worshipped for several years. Father Roux came in 1830 and took charge of the congregation, and five years later he purchased from a Canadian Frenchman a tract of 40 acres upon the hill adjoining the present site of the Roman Catholic cathedral and the bishop's residence. A part of this tract was cleared of the heavy timber, and a log church was erected, and here the congregation, composed chiefly of French-Canadians and half-breeds, scattered over more than 400 square miles, worshipped for 20 years. As soon as the Indian land was purchased settlers poured into it from the settlements east of it. Other religious denominations came till at the present time the number of churches in Kansas City is 180. The following will show the number of religious organizations. Baptist (32), Christians (15), Christian Scientist (3), Congregational (10), Episcopal (8), Evangelical (4), Hebrew (4), Lutheran (4), Methodist Episcopal (25), Methodist Episcopal South (8), Presbyterians (16), Reformed (1), Roman Catholic (20), Universalists (3), Unitarians (1), miscellaneous (23).

Public Schools.—The present public school system was organized 1 Aug. 1867, and in October of that year the schools were formally opened in rented rooms which had been hastily and scantily furnished. Bonds were issued, sites were purchased, and school houses erected. Sixteen teachers were employed during the first year, and about 1,200 pupils were enrolled. From this small beginning the school district has been enlarged till there are 52 different public school buildings, including sites valued at \$3,347,390, with an enrolment of 29,591 pupils,

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of whom 3,700 are in the four high schools, being the largest per cent of high school pupils in any city in the United States having a population of more than 100,000 inhabitants. There are 718 teachers employed in the public schools. The public library, in which there are 43 persons employed, is also under the control of the board of education. In addition to the public school system, there are 60 other schools of various kinds, including private and parochial schools, medical and dental colleges, commercial schools, a school of oratory, fine arts, and an excellent school of law. Politics has been kept out of the city schools, and this is due largely to the plan suggested in 1876, when Superintendent Greenwood proposed that a non-partisan board composed of three Republicans and three Democrats be elected, and the board has been thus kept ever since. There are 850 persons employed in various capacities in the public schools and the public library, and the cost of operating the schools and public library is \$663,979.52. It is a noteworthy fact that since the organization of the board of education 36 years ago with six men serving all the time, only 29 different men have composed its membership. Two members are elected every two years, and the term of service is six years. Kansas City was the first city in the United States to make its school board non-partisan.

Parks and Cemeteries.—The city has spent nearly \$6,000,000 for its parks, which contain 2,089.9 acres, divided into six park districts: The North Park District, 219.39 acres; South Park District, 148.40 acres; West Park District, 165.07 acres; East Park District, 66.24 acres; Westport District 136.80 acres; Swope Park District, 1,354.00 acres. The system is divided into 19 different parks, nearly all of which are connected by an extensive system of 15 boulevards in connection with parkways, speedways, and pleasure resorts. Located in different parts of the city and easy of access are eight cemeteries, the largest of which are Union, Elmwood, St. Mary's and Forest Hill.

Public Buildings.—Among the public buildings are Convention Hall, which will seat 25,000 persons; city hall, county court-house, post-office, public library, Board of Trade building, New York Life building, Central high school, and the Manual Training high school, four large theatres, and also libraries and reading rooms. The public library, art gallery and museum, located at Ninth and Locust Streets, cost \$250,000, and is under the management of the board of education. There are 90,000 volumes in the library, paintings in the art gallery of the value of \$200,000, and a rare collection of natural history specimens in the museum, especially rich in Indian curios. There are 30 hospitals, asylums and homes. A large per cent of the citizens own their own homes, which adds to the civic pride and the material prosperity of the city.

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J. M. GREENWOOD,
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Kansas-Nebraska Bill, a bill passed by Congress in 1854; the last of three compromises between the aggressive slavery expansionists of the South and their antislavery opponents in the

North. It is famous because, by its repeal of the first, the Missouri Compromise (q.v.), it precipitated the organization and rapid growth of the Republican party, and especially incited the radical abolition sentiment of the North to aggressive action, thus causing or hastening the secession of the Southern States and the resulting Civil War. Its passage was mainly due to the leadership of Stephen A. Douglas (q.v.), of Illinois. The second compromise occurred when New Mexico and Utah came to be organized as Territories in 1850. The compromise consisted of the provision, which was also one of the two principal features of the Kansas-Nebraska Bill that when these Territories came to be admitted as States they should come in with or without slavery as their constitutions, which would be framed by the people, might prescribe. The strengthening of the fugitive-slave law was the other feature of this compromise. This settlement of 1850 was the first step toward the final compromise, the Kansas-Nebraska Bill.

As early as 1844 Stephen A. Douglas introduced in the House of Representatives a bill "to establish the Territory of Nebraska," and Douglas afterward asserted that he took this method of serving notice on the secretary of war to discontinue using that Territory as the dumping-ground for Indians. In 1848 Douglas, now chairman of the Committee on Territories in the Senate, introduced in that body a bill for the same purpose. In December 1851 Willard P. Hall of Missouri gave notice in the House of a bill for the organization of Nebraska; but none of these bills got beyond the committee stage. On 2 Feb. 1853 William A. Richardson of Illinois, the leading lieutenant of Douglas in the House, introduced still another bill "to organize the Territory of Nebraska." This bill, which, like all of its predecessors in question, made no reference to slavery, passed the House, 10 Feb. 1853; but in spite of the strenuous endeavors of Douglas in its behalf, it failed of consideration in the Senate. The long debate over this bill in the House disclosed clearly that the primary object of members from the Northwest, who were its champions, was to protect and encourage travel over the great upper line to the Pacific coast, and make way for the ultimate construction of the already much talked of Pacific railroad; while members from the South, and especially from the Southwest, were bent on keeping this northern region open for the colonization of their undesirable Indian tribes, with the purpose of securing travel and the railroad to the Pacific coast through their own country.

Early in the session of the next Congress—14 Dec. 1853—Senator Dodge of Iowa, a coadjutor of Douglas in this enterprise, introduced a bill to organize the Territory of Nebraska. This bill also originally contained no reference to slavery; but by amendment it became the famous Kansas-Nebraska Bill, which finally became a law 30 May 1854. On 4 Jan. 1854 the Senate Committee on Territories, through Douglas, reported a substitute for the Dodge bill which contained the compromise provision of the Utah and New Mexico acts; namely, that "the Territory of Nebraska, or any portion of the same, when admitted as a State or States, shall be received into the Union with or without slavery, as their constitutions may prescribe at the time of their admission." In his famous report, accompany-

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ing this bill, Douglas points out that "eminent statesmen hold that Congress is invested with no rightful authority to legislate upon the subject of slavery in the Territories, and that therefore the 8th section of the Missouri Compromise is null and void; while the prevailing sentiment in large sections of the Union sustains the doctrine that the Constitution of the United States secures to every citizen the inalienable right to move into any of the Territories with his property of whatever kind or description, and to hold and enjoy the same under the sanction of law." The report pointed out also that under this section it was a disputed point whether slavery was prohibited in the new country by valid enactment, and advised against the undertaking by Congress to decide these disputed questions. The bill was further amended so as to provide that all questions pertaining to slavery in the Territories and the new States to be formed therefrom be left to the decision of the people residing therein; that cases involving title to slaves be left to the courts; and that the provision of the Constitution in respect to fugitive slaves should be carried out in the Territories the same as in the States. On 16 January Senator Dixon of Kentucky offered an amendment, which was accepted by Douglas, expressly repealing the slavery restriction clause of the Missouri Compromise; and the bill passed with these amendments.

The repeal of the Missouri Compromise restriction was hotly denounced by the anti-slavery element, and was seized with alacrity and used with great effect as a political weapon by antislavery agitators and politicians; and Douglas was also savagely denounced for selfish subserviency to the South for the sake of winning the Presidency. But Douglas and his friends ably and plausibly defended the repeal of the Missouri restriction on the ground that it was consistent with and the natural sequence of the popular sovereignty compromise of 1850; that there was danger that it would be held unconstitutional by the courts; that there was ground for fear that Dixon's amendment, as he proposed it, would legislate slavery into the Territories, and that on the whole Douglas, as leader of the dominant party, and having regard to the preservation of the Union as well as to the vexatious slavery question, made the safest and best terms practicable in securing the right of the people to decide the question of slavery for themselves. In the course of the debate on the bill Douglas, as well as Thomas H. Benton, who was opposed to the repeal of the Missouri restriction, insisted that, left to the people, slavery could never be successfully introduced into Kansas or Nebraska.

Impartial consideration of all the facts bearing upon this phase of the question leaves no ground for the charge preferred by leading historians and others that the proposed Nebraska Territory was at last divided into Kansas and Nebraska at the instance of Southern members to gain opportunity to make Kansas a slave State. The "provisional" delegate in Congress at that time from Nebraska, well known by still living contemporary citizens of the Territory as a reliable man, in his published account of his part in the transaction asserts that, before he went to Washington to attend the session of December 1853, it was agreed among the enterprising citi-

zens of western Iowa—there were then no citizens of Nebraska—who were pushing the project for Territorial organization, that division was desirable so that one of the Territories might be directly opposite their State, and that he urged this change upon Douglas, who assented to it. In the debate on this feature of the bill Senator Dodge of antislavery Iowa and Representative Henn of the Iowa district bordering on Nebraska urged the division for the frankly expressed reasons that it would be to their advantage to have the capital of an important commonwealth opposite them, and would aid in securing the route of the Pacific railroad through their part of the country; while the representatives of slaveholding Missouri were indifferent to the question of division. Douglas himself specified the wish of the Iowa members as the basis of his reason for the division of the Territory. It is significant, moreover, that Douglas had always stood for a northern Territory, as shown by his original bills of 1844 and 1848. It is a very significant fact that the northern boundary of the Territory in each of these bills was the 43d parallel, which is identical with the northern boundary of the present State; and that the southern boundary described in the bill of 1848 was also identical with the same boundary of the State, while the southern boundary described in the bill of 1844 was only two degrees farther south. These and other incidents of a like kind show a remarkable prescience and a persistent consistency in interpreting the wishes and interests of those most directly interested in the Territory opposite the State of Iowa and on the line of the great natural highway connecting Chicago, the commercial mart of the Northwest, and the home of Douglas, with the Pacific coast. Mr. Henn in resenting "the unjust charge made on this floor by several that it (the proposed division) was the scheme of Southern men whereby one of the States to be formed out of these Territories was to be a slave State," put the case concisely: "The bill is of more practical importance to the State of Iowa and the people I represent than to any other State or constituency in the Union."

The Kansas-Nebraska Bill was also distinguished by more completely safeguarding the rights of Indian occupants than any previous Territorial organic acts had done; and likewise in being the first Territorial bill of that class which provided for the choice of the members of both houses of the legislature by popular election, to drop the provision requiring the submission of all acts of the legislative assembly to Congress for approval. The Territory organized by this bill comprised all of the unorganized part of the Louisiana Purchase north of the 37th parallel, which comprised all of the Purchase north of that line except the States of Iowa and Missouri, and that part of the Territory of Minnesota between the Mississippi River on the east and the Missouri and White Earth rivers on the south and west.

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Kansas State Agricultural College, a co-educational institution, located at Manhattan, Kan.; established in 1863 by the presentation to the State of Bluemont College. The college has excellent opportunities for experimental works as it cultivates 544 acres of land; 323 acres of which is owned by the college, and 221 acres

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leased. It is not a classical school; the departments, the courses of which lead to the degree of bachelor of science, are agriculture, English, mechanical and electrical engineering, general and domestic science. It has also a preparatory department, a music school, and a trade school. It has several short courses, as: dairying, 12 weeks in winter; agriculture and mechanics, 12 weeks in winter, for two years; horticulture and mechanics, 12 weeks in winter, for two years; and domestic science, 12 weeks in fall, for two years. The faculty numbered in 1902, 59, and the number of pupils in attendance was 1,400. The school has no income from tuitions; but receives from the State \$22,700; from the "Land Grant Fund" of 1862, \$32,300; and by the United States Appropriation Act of 30 Aug. 1890, \$25,000, making a total annual revenue of \$80,000. It received also for the experiment station (United States Act of 2 March 1887) the sum of \$15,000. A weekly periodical, devoted to the interests of the subjects taught in the school, and called the "Industrialist," is published by the faculty. The library has about 25,000 volumes, and the value of the college property is (1903) about \$600,000.

Kansas Wesleyan University, a coeducational institution, founded in 1886 under the auspices of the Methodist Episcopal Church, at Salina, Kan. In 1902 there were connected with the school 34 professors and instructors, and pupils in attendance 985. There were in the library 5,000 volumes.

Kant, kānt, Immanuel, German metaphysician: b. Königsberg, Prussia, 22 April 1724; d. there 12 Feb. 1804. His first education, of a strictly religious character, he received at home, his father, whose family is believed to have been of Scottish origin, being a saddler of limited means. He early showed great application to study, and was sent to the Collegium Fredericianum, and then (in 1740) to the university of his native city. His progress at college and at the university was rapid and brilliant, his studies embracing mathematics and physics, as well as philosophy. Leaving the university after three years, he engaged in tuition, and it was not till 1755 that he took his degree. Soon after this he was appointed one of the teachers in the Königsberg University, and lectured on logic, metaphysics, mathematics, and natural philosophy, to which, at subsequent periods, he added natural law, moral philosophy, natural theology, and physical geography. In 1770 he became a full professor, obtaining the chair of logic and metaphysics, a post that he occupied till 1797. Dissatisfied with the dogmatisms of Wolff and the skepticism of Hume, he set himself to investigate the field of metaphysics for himself, and in the first place proceeded to the examination of the origin, extent, and limits of human knowledge. According to him, part of our knowledge is knowledge *a priori*, or original, transcendental, and independent of experience; part of it is *a posteriori*, or based on experience. What he calls the "pure reason" has to do with the former. His great work, the "Kritik der reinen Vernunft"—Critique of Pure Reason (first edition 1781), contains the foundation for his whole system of philosophy. In the preface to a later work, the "Kritik der Urtheils-kraft"—Critique of the Power of Judgment (1790), he defines "pure reason" thus: "Pure reason is the faculty to understand by *a priori*:

principles; and the discussion of the possibility of these principles, and the delimitation of this faculty, constitutes the critique of pure reason. In the first rank of such ideas as we do not derive from experience are space and time. Kant shows that all our perceptions are submitted to these two forms, hence he concludes that they are within us, and not in the objects; they are necessary and pure intuitions of the internal sense. The three original faculties, through the medium of which we acquire knowledge, are sense, understanding, reason. Sense, a passive and receptive faculty, has, as already stated, for its forms or conditions space and time. Understanding is an active or spontaneous faculty, and consists in the power of forming conceptions according to such categories as unity, plurality, causality, etc., which categories are applied to objects of experience through the medium of the two forms of perception, space and time. Reason is the third or highest degree of mental spontaneity, and consists in the power of forming ideas. As it is the province of the understanding to form the intuitions of sense into conceptions, so it is the business of reason to form conceptions into ideas. Far from rejecting experience, Kant considers the work of all our life but the action of our innate faculties on the conceptions which come to us from without. He proceeds in a similar way with morality; the idea of good and bad is a necessary condition, an original basis of morals, which is supposed in every one of our moral reflections, and not obtained by experience. He treats this part of his philosophy in his "Kritik der praktischen Vernunft"—Critique of Practical Reason (1788). Other important works of his are: "De Mundi sensibilis atque intelligibilis Forma et Principiis" (1770); "Prolegomena zu einer jeden künftigen Metaphysik, die als Wissenschaft wird auftreten können" (1783); "Grundlegung zur Metaphysik der Sitten" (1785); "Metaphysische Anfangsgründe der Naturwissenschaft" (1786); "Die Religion innerhalb der Grenzen der blossen Vernunft" (1793); "Metaphysik der Sitten" (1797). Complete editions of Kant have appeared edited by Rosenkrantz and Schubert (1838-42), Hortenstein (1867-9); and Kirchmann. English translations include those of the "Critique of Pure Reason" by Meiklejohn (1854) and Max Müller (2d ed. 1896); of the "Prolegomena" by Mahaffy and Bernard (2d ed. 1889); Bax (1883); Carus (1903); of the "Critique of Practical Reason" by Abbott (2d ed. 1898); of the "Critique of Judgment" by Bernard (2d ed. 1892); of the "Philosophy of Laws" by Hastie (1887); of the "Principles of Politics" by Hastie (1891); of the "Cosmogony" by Hastie (1900). Consult: E. Caird, "Critical Philosophy of Kant" (1859); Mahaffy, "Kant's Critical Philosophy for English Readers" (1872-74); Watson, "Kant and his English Critics" (1881); Stirling, "Textbook to Kant" (1881); Morris, "Kant's Critique of Pure Reason" (1882); Paulsen, "Immanuel Kant, sein Leben und seine Lehre" (1898, Eng. trans. 1902); Vaihinger, "Commentar zu Kants Kritik der reinen Vernunft" (1881-92).

Ka'olin. See CLAY; CHINA; PORCELAIN; POTTERY.

Kapok', a kind of silk-cotton. See SILK-COTTON TREE.

Kapp, Friedrich, frēd'rīk käp, German biographer and historian: b. in Hamm, West-

KARA — KARR

phalia, 13 April 1824; d. Berlin 27 Oct. 1884. He left Germany at the outbreak of the revolution of 1848, and settling in New York in 1850, took active part in American politics. In 1860 he was a presidential elector and in 1867 commissary of education. Returning to Germany in 1870, he entered the Reichstag in 1872. His works, which mainly refer to the United States, include 'American Soldier Traffic by German Princes' (1864); 'German Emigration to America' (1868); 'History of the German Migration into America' (1867); 'Frederick the Great and the United States' (1871); etc.

Kara (kä'rä) **Sea**, an arm of the Arctic Ocean indenting the north coast of Siberia, between Nova Zembla and Yalma Peninsula. The Yenisei and Ob rivers flow into this sea. Since 1875 when Nordenskjöld made his voyage in the Vega, several navigators have sailed on this sea and found that it is not, as once supposed, ice-locked all the year; but is open in July and August. Consult: Hovgaard, an article in the 'Scottish Geographical Magazine' (January 1890) on a route to the North Pole.

Karadzic, kā-rä'jēch, **Vuk Stefánovic**, Servian author: b. Trschitsch, Servia, 7 Nov. 1787; d. Vienna, 7 Feb. 1864. The two great works of his life were the reformation of the Servian literary language (which, up to his time has been a very debased medium, being either rude Slavonian or a hybrid jumble of Serb and Slavonian), and the publication of the 'Popular Serb Songs' (4 vols. 1814-33; 3d ed. 1841-46). His epoch-making Serbian-German-Latin 'Dictionary' appeared in 1818. The songs attracted widespread attention, and were translated into every European tongue. He was the founder of modern Servian literature.

Karageorgevitch, kā-rä-gä-org'a-véch, PRINCE Peter, king of Servia: b. Belgrade 1846. He was educated at Belgrade, but when his father, Alexander Karageorgevitch, was driven from the throne in 1858, he became a soldier of fortune and pretender. After training in France at the St. Cyr school and the Military staff college, he fought in the foreign legion during the Franco-Prussian war. Later he took part in Herzegovina's struggle for liberty. Upon the assassination of Alexander I. Obrenovitch in 1903, Prince Peter was proclaimed king of Servia by the army. See SERVIA, History.

Ka'raites. See JEWISH SECTS.

Karankawan, kā-rän'ka-wän, an American Indian tribe, now extinct. They formerly lived along the Texas coast in the vicinity of Matagorda Bay, and originally came from Central America. They were first mentioned in 1687, by the French explorer Joutel, and were regarded as cannibals. They were uncompromisingly hostile to the whites. In 1843, fifty survivors of the race removed to Mexico, where in 1858 the last of them were exterminated by Mexican ranchers.

Karaveloff, kā-rä-vä'löf, **Petko (PETER)**, Bulgarian statesman: b. Kalofer 1840; d. Sofia 7 Feb. 1903. He studied in Moscow, in 1878, became vice-governor of Vidin, in 1879 was a founder of the Liberal party, in 1880 was appointed minister of finance, and later in that year assumed the premiership. After the coup d'état of Prince Alexander, he retired to Eastern Rumelia, but on the restoration of the constitu-

tion in 1883 returned, and in 1884-6 was again premier. In 1886 he was appointed to the regency on the abdication of Alexander (7 Sept.), but after the election of Ferdinand (7 July 1887) his power waned; in 1890 he was sentenced to a five-years' imprisonment for conspiracy. Pardoned, however, he was elected to the Sobranye, or national assembly, and from 4 March 1901 to January 1902 he was premier, his resignation being compelled by opposition to his conclusion of a French loan.

Karawala. See CARAWALA.

Karli, kär'lë, a Buddhist cave-temple of India, rich in sculpture, and divided like a church into nave and aisles, with an apse. The temple probably belongs to the 1st century.

Karlowitz, kär'lō-vits, or **Carlovitz**, a town of the Austrian empire, on the frontier of Slavonia. The great vine mountain in the vicinity yields the best and strongest qualities of Hungarian wines. A peace was concluded here in 1699, between Austria, Poland, Russia, Venice, and Turkey. In 1848-9, Karlowitz was the focus of the Servian rebellion against Hungary, and the theatre of collision between the Servians and the Magyars, and at a later period between the Hungarians and the Austrians. The town contains a Greek cathedral and is the seat of the Greek archbishop of the Servian nationality. Pop. (1900) 5,643.

Karlsbad. See CARLSBAD.

Karlshamn. See CARLSHAMN.

Karlskrona. See CARLSCRONA.

Karlsruhe. See CARLSRUHE.

Karlstad. See CARLSTAD.

Karlstadt. See CARLSTADT.

Kar'ma, (1) in Buddhism, the judgment at death which determines the future state of the deceased. It is also the fiat of the Buddhists on actions, pronouncing them to be meritorious, or otherwise. (2) In theosophy, Karma means the unbroken sequence of cause and effect, each effect being in its turn the cause of a subsequent effect. It is a Sanskrit word meaning "action" or "sequence." See BUDDHISM: E.O.; THEOSOPHY.

Karma'thians, a former Mohammedan sect, founded in Irak by Karmath during the 9th century. Missionaries were trained to spread his creed, and one of them, Abu Said, gained a strong hold on the people of the Persian Gulf. The caliph, afraid of the influence of the new sect, sent an army for its suppression, but he was defeated, and Abu Said took possession of the whole country.

Kar'nak. See THEBES.

Karr, Jean Baptiste Alphonse, zhōn báp-tēst äl-fôns kär, French novelist and satirist: b. Paris 24 Nov. 1808; d. Nice, France, 30 Sept. 1890. He was educated at the Collège Bourbon, where he subsequently taught, and began in 1832 to write for the 'Figaro,' becoming its editor-in-chief in 1839. In that year he established 'Les Guêps' (the Wasps), a monthly journal of satire which aroused many enmities. His earliest books were novels, among them: 'Sous les Tilleuls' (1832); 'Vendredi Soir' (1835); 'Geneviève' (1838); 'Clotilde' (1839); among later works may be named: 'Voyage autour de mon Jardin' (1845); 'Gaités ro-

KARROOS — KASSALA

maines' (1870); 'Dieu et Diable: le Credo du Jardinier' (1875). The latter portion of his life was passed at Nice where he was a devoted gardener, several flowers having been named in honor of him.

Karroos, kā-rooz', the Hottentot name, now adopted by physical geographers, for the table-land or extensive plains between the mountain ranges of Cape Colony. They are fertile during the short rainy season, but during the dry season they assume the appearance of parched arid deserts, though even then flocks and herds find a certain amount of food on them. In recent times artificial methods of procuring water for these tracts have been adopted. In some places great reservoirs have been made to impound the water of permanent streams, or streams that exist only in time of rain; many wells have also been sunk, from which water may be pumped by means of windmills if it does not rise of itself. In this way large areas of the Karroos are now occupied as farms on which more or less grain is grown. Kloof, a sort of companion name to karroo, is applied to the longitudinal valleys extending between the ranges of the adjacent hills.

Kars, (1) a province of Russia, in the southwestern part of Transcaucasia; area, 7,188 square miles. It is mountainous, but the chief occupations are agriculture and stock-raising. Pop. estimated, 300,000. (2) Kars, the capital of the province of Kars, is about in the centre of the province, on a high plateau, barren in part but productive in the vicinity of the city. It was formerly a Turkish fortified city, and since it became a Russian possession (1878) the fortifications have been strengthened. The city has some manufactures, carpet-mills, cotton and woolen factories. Pop. about 22,000.

Karun, kā-roon', the only navigable river of Persia, and important as a route to the interior. About 117 miles from the mouth navigation is impeded by the rapids of Ahwaz. Formerly the Karun flowed direct to the sea, but now it traverses an artificial channel leading it into the Shat-el-Arab, which it joins at Mohammerah. It has recently been opened to foreign trade as far as Ahwaz.

Karyokinesis, kar'-yō-kī-nē'sis, the process of development of the ovum under the influence of fertilization. See CELL; EMBRYOLOGY.

Kasan. See KAZAN.

Kasbin, kās-bēn', or **Kazvin** (also spelled CASVEEN, CASBIN, and KAZBIN), Persia, a town in the province of Irak-Ajemi, about 90 miles west-northwest of Teheran. It is built of kiln-burned bricks, and had once a great number of elegant mosques and well-constructed bazaars, but a large proportion of the buildings are now ruined and deserted, partly as the result of repeated earthquakes. The manufactures include tanning, weaving, etc., and there is a considerable transit trade. There are many vineyards and gardens in the neighborhood. Pop. estimated at 40,000.

Kashgar, kāsh-gār'. See CASHGAR.

Kashmir. See CASHMERE.

Kaskas'kia, an American Indian tribe of the Algonquian family, formerly occupying a part of southern Illinois. In 1832, the survivors of the race, with the Peorias, removed to Kansas,

and affiliated with the Weas and Piankishaws. The four tribes removed to Indian Territory in 1867, and in 1903 scarcely 100 members of the four tribes remained. See INDIANS.

Kaskaskia, Ill., a township in Randolph County, on both sides of the Kaskaskia or Okaw River, at its junction with the Mississippi opposite Ste. Genevieve, Mo. A part of it now obliterated was the oldest town in the West, the first permanent white settlement in the Mississippi Valley. Marquette in 1675 had established a mission among the Kaskaskia Indians near the present Utica, Ill., on the Illinois River; the Jesuits Marest and St. Cosme, guided by Tony (q.v.), removed the mission in 1700 to the Mississippi bottoms three miles from the river, near the Kaskaskia. It thrived greatly, and was not only a large Indian market, but sent produce and furs to New Orleans. Fort Chartres was built there in 1720; eminent French officers and adventurers came thither—as Vaudreuil and the commandant Chevalier de Bertel—and with its gay French life it was named "the Paris of the West." A noted Jesuit college and convent were maintained there. It formed one of the chain of posts by which France was to hem in English colonization; but in 1763 it fell into the hands of the English, who made it their capital in that region. On 4 July 1778 George Rogers Clark (q.v.), with a company of 200 Virginia militia, captured it for the United States by a night attack; this enabled us to claim and obtain possession of the Northwest Territory by the peace of 1783, and changed the destiny of this whole region. It remained a leading western town, and was the capital of Illinois as a Territory (1809) and a State (1818); but on removal of the seat of government to Vandalia in 1819, it began to decline. The river steadily encroached on the meadow; and in 1892 united its course with the Okaw, converting a large part of the old site, with most of the ancient buildings, into an island, which in 1899 crumbled into the river after several great floods. North of the junction still remains about a third of the town site, with the foundations of a church and of the capitol building. In 1891 the Illinois legislature appropriated \$50,000 to remove the old cemetery to a point on the bluffs, and a large monument has been erected there. Consult: 'Kaskaskia: A Vanished Capital' (in 'Chautauquan,' Vol. XXX., 1900); 'Kaskaskia and its Parish Records' (in 'Magazine of American History,' Vol. VI., 1880).

Kaskaskia River, rises in Champaign County, Ill., and flows southwest through Moultrie, Shelby, Clinton, Fayette, and St. Clair counties, finally joining the Mississippi in Randolph County. It formerly entered at Chester, but in 1891 (see below) the great river cut away the neck of land at Kaskaskia and joined it there. It is nearly 300 miles long, and navigable to Vandalia, 150 miles. It flows through a fertile rolling country which is part of the Illinois coal field.

Kassai, kā-sī', a tributary of the Kongo, which it enters from the south a short distance above Stanley Pool, pouring into the Kongo a vast volume. It is navigable for hundreds of miles.

Kassala, kā-sā'lā, North Africa, a town at the southeastern extremity of the Egyptian Su-

KASSON—KATIPO

dan, near the border of Abyssinia, formerly belonging to Egypt, and once a commercial centre. Before the Mahdi's uprising it had a population of perhaps 20,000. Italians captured it from the Mahdists in 1894, and in 1897 it was restored to Egypt. Its population is now supposed to be about 10,000.

Kas'son, John Adam, American lawyer and diplomatist: b. Charlotte, Vt., 11 Jan. 1822. He was graduated from the University of Vermont in 1842, studied law at Worcester, Mass.; was admitted to the bar, and in 1857 moved to Iowa and continued the practice of his profession. He became active in the Republican party, was a delegate to the national convention in 1860 and chairman of the State committee in the campaign; was assistant postmaster-general in 1861-2; and commissioner to the International Postal Congress at Paris in 1863. He was elected to Congress in 1863 and served until 1867; in the next year was elected to the Iowa State legislature, and from 1873 to 1877 was again a member of Congress. He was then appointed minister to Austria, which position he held till 1881. In 1881-4 he served again in Congress, and from 1884-5 was minister to Germany; in 1885 he was commissioner to the Kongo International Conference at Berlin, and special envoy to the Samoan International Conference in 1893. In 1897 he was appointed special commissioner plenipotentiary to negotiate reciprocity treaties as provided for by the Dingley Tariff Law, and in 1898 was a member of the American Canadian Joint High Commission. He has written 'History of the Monroe Doctrine' (in the 'North American Review' 1881); 'History of the Formation of the United States Constitution' (1889).

Kästner, kést'nér, Abraham Gotthelf, German mathematician and poet: b. Leipsic 27 Sept. 1719; d. Göttingen 20 June 1800. He received an appointment at Göttingen, where, in accordance with the reformatory spirit which animated that university in the latter part of the 18th century, he exerted a powerful influence in delivering mathematical and natural sciences from the bondage of antiquated text-books. His 'Anfangsgründe der Mathematik' (6th ed. 1800), and his various other writings, inaugurated a more enlightened era of scientific study in Germany. He took a conspicuous part in the formation of the celebrated union of Göttingen poets, and by his assistance the elder Boye succeeded in introducing, through the instrumentality of the 'Musenalmanach,' an entirely new generation of poets to the public. His general popularity was chiefly due to his 'Sinngedichte.' A portion of his epigrammatic poems were included in his 'Miscellaneous Writings' (1783).

Kastner, Johann Georg, yō'hān gā'örg käst'nér, German composer and writer on music: b. Strasburg 9 March 1810; d. Paris 19 Dec. 1867. He studied with Maurer and Romer; in 1832-5 composed four operas, of which 'Die Königin der Sarmaten' (1835) is chief; and then removed to Paris, where he wrote other operas, among them his best work, 'Le dernier Roi de Juda,' presented at the Conservatoire in 1844. From 1837 he also published a series of elementary treatises on music, a once authoritative work on instrumentation being perhaps the best. He was made an associate of the Académie Française.

Katab'olism, otherwise known as destructive metabolism; the chemical changes occurring within an organism and resulting in the formation of simpler products through the decomposition of more complex ones.

Katahdin, ká-tä'din, or **Ktaadn**, the highest mountain in Maine, situated in Piscataquis County and in the central part of the State. The region is difficult of access, the Penobscot River being the only thoroughfare, and its course being interrupted by frequent shoals and falls. The mountain, which has an altitude of 5,385 feet, is entirely of granite, and stands in abrupt walls with acres of surface exposed in naked floors. Its sides which are marked by bare spots caused by sliding rock, present a striking appearance. On its summit are found only lichens and a few dwarfish plants; half-way down, the birch and other forest trees are stunted. Over the granite rocks, even to the summit, are found boulders of trap and of other rocks not belonging to the mountain, and among them pieces of sandstone containing fossil shells. The view of the country from the summit embraces scattered mountains rising in conical granitic peaks, among which are interspersed hundreds of lakes, many of them large, and innumerable streams.

Katatypy, a new method in photography. Over the finished negative is poured a solution of hydro superoxide. This leaves, after evaporation, a uniform layer of peroxide of hydrogen. Soon the silver of the plate works upon this peroxide and produces a catalytic dissolution wherever there is silver, while in the places free from silver the peroxide remains. By this means an invisible picture of hydro superoxide is produced upon the plate. This picture can be printed from the plate directly upon common paper, to which the image is transferred.

Ka'ter, Henry, English physicist: b. Bristol 16 April 1777; d. London 26 April 1835. In 1799 he went to India where he was engaged on the great trigonometrical survey, a work to which he rendered important service. In 1814 he retired on half-pay, and henceforth occupied himself exclusively with scientific studies. He was employed by the emperor of Russia to construct standards for the weights and measures of that country; determined the length of the seconds pendulum (see KATER'S PENDULUM), investigated the diminution of terrestrial gravity from the pole to the equator; and invented the "floating collimator," an instrument of great use to trigonometers. With Dr. Lardner he wrote the 'Treatise on Mechanics' in the 'Cabinet Cyclopaedia.'

Kater's Pendulum, a contrivance for measuring the force of gravity, named from its inventor Henry Kater (q.v.). The principle governing its action is the fact that in the case of a physical (compound) pendulum the centres of oscillation and of suspension are interchangeable. It is a bar pendulum with two sets of knife edges, symmetrical in form, but not in the distribution of masses with reference to the geometrical centre; and, somewhat modified and improved, is now the standard for geodetic work.

Kati'po, the New Zealand name for alleged poisonous spiders of the genus *Latrodectus* (q.v.).

KATIPUNAN—KAUFMAN

Katipunan (kä-tē-poo'nän) Society, a secret society in the Philippines, organized originally to oppose Spanish supremacy. At the adjournment of the Filipino Congress it was decreed that the supreme council of the Katipunan Society should assume control of native affairs. The society organization was purely military, with a chief or colonel assigned to each 100 members. Each member signs an oath written in his own blood, swearing under most revolting penalties to serve and obey the society. The membership in the organization has gradually decreased since the American occupation.

Katsura, käts-wē'a, COUNT, Japanese soldier and statesman: b. Chosiu 1847. He received a military training in Prussia, entered the Japanese army in 1867, fought in the war of the Mikado's restoration, was vice-minister of the army in 1886-91, and in the Chino-Japanese war (1894-5) commanded the 3d division, with which 4 March 1895 he captured New-chwang. In 1896 he was governor-general of Formosa, in 1898-1900 minister of war, and in 1901 became prime minister.

Katte, Walter, American civil engineer: b. London, England, 14 Nov. 1830. Coming to the United States in 1850 he was resident engineer of the Pennsylvania State canals 1857-8, and subsequently held various engineering posts of responsibility. From 1865 to 1875 he was in the employ of the Keystone Bridge Company of Pittsburg, superintending at this time the building of the steel arch bridge at St. Louis. He was chief engineer of the New York elevated railroad 1877-80, and from 1880 to 1898 held similar posts on other important railroads, including the New York Central.

Ka'tydids, large neuropterous insects of the grasshopper family *Locustidae*, remarkable for their loud and shrill call. The katydids belong to several allied genera which have the head obtuse in front, the wings and wing-covers large and leaf-like, and the color bright green. Highly developed stridulating organs are found in the males in the form of transparent drum-like structures at the base of the wing-covers, by the friction of which, one against the other, as the wings are raised and lowered, the well-known call is produced. This is heard only at night (though some species have quite different day calls as well) and is so loud and shrill as to be distinctly audible at a distance of a quarter of a mile. The call of the males is answered by chirps from the females. The characteristic eggs are gummed to twigs in two contiguous over-lapping rows. Katydids are peculiarly American. The common species is *Cystophylus concavus*, known by its very broad coarse-veined wing-covers and long ovipositor. In *Phylloptera oblongifolia* the wing-covers are narrower and the veins finer. Other related genera are *Phaneroptera* and *Microcentrum*.

Katzbach (käts'bāh) River, a small stream in Silesia, Prussia, falling into the Oder at Parchwitz. On its bank 26 Aug. 1813 a battle was fought between the French and the Prussians in which the latter under Blücher won a signal victory. The French lost 12,000, and 18,000 were taken prisoners.

Katz'er, Frederic Xavier, American Roman Catholic archbishop: b. Ebensee, Austria, 7 Feb. 1844; d. Fond du Lac, Wis., 20 July 1903.

He came to this country in 1864, and was ordained to the priesthood in 1866. Until 1875 he was a professor in the Seminary of St. Francis in Milwaukee, when he became pastor of the cathedral at Green Bay and secretary of Bishop Krautbauer. After four years of labor in this capacity, he was appointed vicar-general of the diocese of Green Bay, and on the death of Bishop Krautbauer, in December 1885, became administrator, and in May 1886, bishop of Green Bay. In December 1900 he was chosen archbishop of Milwaukee.

Kauai, kow'i-, one of the Hawaiian Islands, the most northern of the group, in lat. 22° N. and long. 159° 30' W.; area, 590 square miles. It is of volcanic origin, its highest elevation reaching nearly 6,000 feet; but although mountainous in character the island has a soil of great fertility, a considerable portion of which, mainly in the northern part, is under cultivation. Sugar is the chief product, and tropical fruits are also largely grown. There is great extent of forest land, and the island is well supplied with streams, the largest of which is Hanalei. The principal harbors are Hanalei, Koloa, Nawiliwili, and Waimea. Pop. (1900) 20,734.

Kauffmann, kowf'män, Marie Angélique Catherine, commonly known as ANGELICA KAUFFMAN, Swiss painter: b. Coire, Switzerland, 20 Oct. 1741; d. Rome 5 Nov. 1807. She was the pupil of her father, John Joseph Kauffmann, a painter of little note. Her first work of importance was a portrait of the Duke of Modena and his duchess. She then collaborated with her father in the decoration of the parish church and castle of Schwarzenburg, his birthplace, painting many portraits in the meantime. Going to Florence, she was hindered in her artistic career by her passionate devotion to music and singing, but in 1763 finally abandoned all other pursuits for that of painting. She fell under the influence of Winckelmann at Rome, and produced the 'Mother of the Gracchi.' She also did some work in co-operation with the Venetian landscape painter Zucchi, whom she subsequently married. It was at this point in her life that she developed the particular sentimental style of her paintings as seen in 'Anna and Abra'; and 'Samma at the Grave of Benoni,' which created a furore. In London (1765) she became the darling of court and aristocracy, and was loaded with wealth and honor; she was made member of the Royal Academy and was thought to have inspired Sir Joshua Reynolds with tender feelings. She was, however, unfortunate in marrying a Swede who called himself Count Hom, from whom she was later divorced. She eventually married Zucchi, and settled in Rome (1781). While her tenderness borders on mawkishness, and her designs are monotonous, her imaginative figures have an elevated charm which was not without its influence in circles where George Morland was typical of English art. Her personality cast a reflection which enhanced the impression which her pictures made on her contemporaries, and the 'Miss Angel' of Mrs. Thackeray Ritchie exhibits with tact and fidelity this interpretation of her somewhat remarkable career.

Kaufman, David S., American politician: b. Cumberland County, Pa., 1813; d. Washington, D. C., 13 Jan. 1851. A graduate of Princeton

KAUKAUNA — KAVA-KAVA

University, he removed to Natchez, Miss., where he studied law. In 1837 he settled in Nacogdoches, Texas, and the next year was elected to the Texas Congress. He was twice re-elected and twice chosen speaker of the House. In 1843 he entered the Texan Senate, taking an active part in favor of annexation, and being elected one of the first members of the House of Representatives from Texas (1846-51).

Kaukauna, kā-kā'na, Wis., city, in Outagamie County; on the Fox River, and on two divisions of the Chicago and Northwestern railroad; about 21 miles southwest of the city of Green Bay and seven miles northeast of Appleton. At this point the Fox River has a fall of 50 feet within one mile, which gives the city excellent water power. A government ship canal has been built to overcome the obstruction to navigation caused by the rapids. The place was first settled in 1790 by Dominick Ducharme, and was incorporated as a town in 1850. It was chartered as a city 5 April 1885. The city has two banks with a combined capital of \$160,000; and the bookings show a total of business of \$800,000. The chief industrial wealth of the city is derived from railroad shops, employing 450 men; Union Bag and Paper Company works, 300 employees; Pulp and Paper Company works, 225; Outagamie Paper Company works, 175; Kaukauna Fibre Company, 80; Lindane Pulp Company, 80. The city has 10 churches, one high school, two graded public schools, and two graded parish schools. About one half the population are Germans. Pop. (1900) 5,115.

JAMES I. TOWER,
Editor of 'Sun.'

Kaulbach, Wilhelm von, vīl'hēlm fōn kowl'bāh, German painter: b. Arolsen 15 Oct. 1805; d. Munich 7 April 1874. He learned the rudiments of his art from his father who was a goldsmith and engraver on copper. He was a good draftsman when he went to Düsseldorf in 1821 and entered the Art Academy where his chief teacher was Cornelius, already acknowledged as the head of the Düsseldorf school of historic painting. When Cornelius in 1825 removed to Munich, at the invitation of King Ludwig of Bavaria, he followed him and soon became his disciple in the art of ceiling decoration, examples of which are 'Apollo and the Muses' in the great hall of the Odeon, and the allegorical figures of the 'Four Chief Rivers of Bavaria,' and of 'Bavaria' in the portico of the royal palace. His pure and classic power of design is well exhibited in the 16 wall paintings, illustrating the story of 'Cupid and Psyche,' in the palace of Duke Maximilian at Munich. He was at this time attracted to the study of Hogarth's works, the fruit of which appeared in his illustration of books, including the works of Shakespeare, Goethe, and Schiller, and the Reineke Fuchs. He painted many great incidents in the history of Germany, including twelve scenes from Klopstock's 'Hermann's Fight,' and the 'Death of Hermann,' wall paintings in the queen's palace at Kingsbau. But his most ambitious and comprehensive works are those in which he endeavored to represent the progress of the human race by a series of typical historic tableaux. These comprise the 'Tower of Babel'; 'Age of Homer'; 'Destruction of Jerusalem'; 'Battle of the Huns and Romans';

'The Crusaders'; 'The Reformation' (1847-63). The range of his intellectual ideas, his wonderful power of generalization, his mastery of every style of painting from caricature to the sublimity of the Italian cinquecentists, as represented by Michelangelo, have no parallel among modern painters. His coloring may be a little cold, sometimes a little crude, but his sense of form, his loftiness of conception and his genius for harmonious composition have won for him the first place among German artists of the transition period between the idealism of Cornelius and the realism of the modern historic school.

Kauri, kow'rī, the native name of a tree, and of the valuable gum derived from it. It is the most conspicuous species (*A. australis*) of the East Indian and Australian genus *Agathis* (formerly *Dammaria*) of coniferous trees,—a native of New Zealand, where it grows only at the northern extremity of the North Island. It reaches the height of 150-200 feet, and its timber is much valued for building purposes, for making furniture, etc., and still more for masts and ship-building, but it is becoming very rare. The resin of this tree, the kauri gum, forms a valuable export, and is used in making fine varnish, etc. Most of it is obtained in a semi-fossil state, by digging in places where the tree no longer grows. See DAMMAR.

Kautz, kowtz, Albert, American naval officer: b. Georgetown, Ohio, 29 Jan. 1839. He was graduated at the United States Naval Academy in 1859, became a lieutenant in 1861 and rose through gradual promotion to the rank of rear-admiral in 1898. He was flag-lieutenant to Farragut in 1862, and when New Orleans was surrendered he entered the city and raised the national flag over the custom-house. He took command of the Pacific station and in the following March was prominent in the settlement of the Samoan troubles. He was retired in January 1901.

Kautz, August Valentine, American general: b. Ispringen, Germany, 5 Jan. 1828; d. Seattle, Washington, 4 Sept. 1895. He was a brother of Albert Kautz (q.v.), and his parents settling in Ohio in 1832, he was graduated from West Point in 1852. He served through the Civil War in the Federal army, distinguishing himself in several engagements, was promoted colonel in 1874, and brigadier-general in 1891. He published: 'The Company Clerk' (1863); 'Customs of Service for Non-Commissioned Officers and Soldiers' (1864); and 'Customs of Service for Officers' (1866).

Kautzsch, kowch, Emil Friedrich, German Protestant theologian: b. Plauen, Saxony, 4 Sept. 1841. He was educated at the University of Leipsic where he became tutor in Old Testament exegesis in 1869, and professor extraordinary in 1871. From 1872 to 1880 he was professor at Basel, at Tübingen 1880-8, and at Halle from the last named date. With Socin and Zimmerman he founded the Palestine Exploration Society of Germany in 1877, and among important works which he has edited are: the 22d to the 26th editions of Gesenius' 'Hebrew Grammar' (1878-96); and the 10th and 11th editions of Hagenbach's 'Encyklopädie und Methodologie der theologischen Wissenschaften' (1880-4).

Kava-Kava. See AVA.

KAVANAGH—KEAN

Kavanagh, kav'a-nä, Julia, Irish novelist: b. Thurles, Ireland, 7 Jan. 1824; d. Nice, France, 28 Oct. 1877. She wrote a large number of novels, the scenes of which were almost invariably laid in France, where her life was mainly spent until she began a literary career in London in 1844. Among her works are: 'Nathalie' (1851); 'Daisy Burns' (1853); 'Two Lilies' (1877); 'Woman in France During the 18th Century' (1850); 'A Summer and Winter in the Two Sicilies' (1858); 'French Women of Letters' (1861); 'English Women of Letters' (1862). Her novels and other works were popular both in this country and in England.

Kaveri, or Kavery. See CAUVERY.

Kaw (more correctly KANZA), a branch of the Osage division of the Sioux Indian stock, formerly living on the lower Kansas River, and early in the 19th century estimated at 1,300. In 1846 the government removed them to a reservation in the present Oklahoma, west of the Osage River; where they dwindled so rapidly that in 1900 there were only 217, over half of them of mixed blood.

Kay, John, English inventor: b. Walmersley, Lancashire, England, 16 July 1704; d. France, after 1764. In 1733 he invented the fly-shuttle, for which a patent was granted him, and in 1745 a power loom for the weaving of narrow goods, a patent for which was also granted. These inventions, however, so greatly aroused the anger of the working classes, who feared that the machines would entirely supersede hand labor, that they stole Kay's machines, wrecked his home, and obliged him to flee to France, where he died in poverty.

Kaye, Sir John William, English military historian: b. Acton, Middlesex, 1814; d. London 24 July 1876. He was for a number of years an officer in the Bengal artillery, but resigned in 1841. In 1856 he entered the East India Company, and upon the transfer of the government of India to the crown, succeeded John Stuart Mill in the political department of the India office. His works consist of histories and biographies relating to the East, among them being 'A History of Afghanistan' (1851-3); 'History of the Administration of the East India Company' (1853); 'A History of the Sepoy War in India' (1857-8; London 1864-75), a comprehensive narrative of the celebrated Mutiny down to the fall of Delhi; 'Lives of Indian Officers' (1867); 'Essays of an Optimist' (1870).

Kazaks'. See KIRGHIZ.

Kazan, kä-zän', Russia, a fortified city, capital of the government of the same name, on the Kazanka, about four miles above its junction with the Volga, 460 miles east of Moscow. It properly forms three towns—the kremlin or citadel, the middle town, and the lower town. Many Mohammedan Tartars still reside here, engaged in business. It is a bishop's see, and the seat of a small university, founded in 1803. It has also several other schools. Here are large soap-works and tanneries, also manufactures of woolen, cotton, lace, and earthenware. It carries on an extensive trade. The caravans to Bokhara and China pass through Kazan. At a little distance from Kazan is an admiralty establishment, with a navigation school, maga-

zines, and a dock-yard, where vessels are constructed, and sent down the Volga to the Caspian Sea. Pop. about 135,000.

Ke'a, a large olive-green parrot of New Zealand (*Nestor notabilis*) with the hawk-like beak of its race, which in its former wild condition fed chiefly upon insects, but since the introduction of sheep into the South Island (to which it is confined) has become a meat eater. These birds haunt the vicinity of slaughtering pens, and feed with avidity upon offal, sheep-heads and the like. This led them to attack wounded sheep, or those with sores; and finally taught some of these parrots to alight upon the back of a sheep, pull out the wool and even tear away the living flesh. These injuries were usually upon the loins, and the fat about the kidneys seems to be the special attraction. So many keas have been killed by herdsmen that the species is now rare. Compare KAKA; and consult Buller, 'Birds of New Zealand' (1888).

Kean, kēn, Charles John, English actor: b. Waterford, Ireland, 18 Jan. 1811; d. Queensborough Terrace, Chelsea, London, 22 Jan. 1868. He was second son of Edmund Kean (q.v.). He made his first stage appearance 1 Oct. 1827 as Young Norval in 'Douglas.' In 1830 he visited the United States, where he was favorably received before he had made a London reputation. In 1850-9 he managed the Princess Theatre, where he introduced more elaborate machinery and setting than had yet been seen on the English stage, revived Byron's 'Sardanapalus,' and appeared (13 Jan. 1855) in his greatest role, Louis XI., in Boucicault's adaptation of de la Vigne's play of the name. His Hamlet was his chief tragic part, but he was best in melodrama. He withdrew from the stage 28 May 1867. Consult: Cole, 'Life and Theatrical Times of Charles Kean' (1850); Cook, 'Hours with the Players,' Vol. II. (1881).

Kean, Edmund, English tragedian: b. London 4 Nov. 1787; d. Richmond Surrey 15 May 1833. His supposed parents were connected in a low capacity with the theatrical profession. He was early on the stage, and for several years wandered about the provinces, now as reciter and singer, now as tumbler in a circus, and later as a member of itinerant companies. He married Miss Chambers, an actress in his company, in 1808. In 1814 he appeared at Drury Lane as Shylock. His triumph was decided and he at once commanded large salaries. Hazlitt and Lamb eulogized him. Coleridge said: "To see Kean act is like reading Shakespeare by flashes of lightning." At Kemble's retirement in 1817 Kean took the foremost place on the English stage. He appeared in several other tragic roles, among them Richard III., Hamlet, Lear, Sir Giles Overreach, and Othello. In these characters he has perhaps never been equaled. He first came to the United States in 1820, when he was seen with enthusiasm in New York, Boston, and Philadelphia. A second, but much less successful tour in 1825 was extended to Canada, where he was chosen a chief of the Huron Indians. His hold on the public remained uninterrupted until 1825, when he appeared in the character of co-respondent in an action of divorce. He never regained public favor; his dissolute habits also began to tell on him, and he made his last appearance in Othello, in company with his son Charles, in 1833, but

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broke down during the performance, and his death took place some three months later. The biographies by Barry Cornwall (1835) and F. W. Hawkins (1869), although the best existing, contain much apocryphal material, a good share of it furnished by Kean himself.

Kean, Ellen Tree, English actress: b. 1805; d. London 20 Aug. 1880. Her début was made at Covent Garden Theatre, London, in 1823, and she soon became known as a talented performer in high comedy. She visited this country in 1839 and was very successful. In 1842 she was married to Charles John Kean (q.v.) and with him visited America again in 1846. She retired from the stage after his death in 1868.

Keane, kēn, John, 1st Lord KEANE, Irish soldier: b. 6 Feb. 1781; d. Burton Lodge, Hampshire, 26 Aug. 1844. He entered the army as a captain in 1794, commanded a brigade of the third division in the Peninsular war and became major-general (1814), was in command of the British force landed in December 1814 for an attack on New Orleans, was superseded by Pakenham and Gibbs on their arrival with reinforcements, and led the left column in the action of 8 Jan. 1815. In 1823–30 he was military commander and civil governor in Jamaica, in 1834–9 was commander-in-chief at Bombay, and in 1839 led the "Army of the Indus" in the invasion of Afghanistan, when Ghuznee was taken (23 July). For this service he was made Baron Keane of Ghuzni and Cappoquin. He attained the rank of lieutenant-general (1830).

Keane, John Joseph, American Roman Catholic archbishop: b. Ballyshannon, County Donegal, Ireland, 12 Sept. 1839. In 1846 he was brought by his family to the United States, and was educated at St. Charles' College and St. Mary's Seminary, Baltimore. He was ordained priest in 1866, and was assistant rector of St. Patrick's Church, Washington, D. C., 1866–78. He became bishop of Richmond in 1878, was rector of the Catholic University of America 1886–97, and was installed archbishop of Dubuque in 1900. He has contributed to various periodicals, and was Dudleyian lecturer at Harvard in 1890.

Kearney, kär'nī, Denis, American labor agitator: b. Oakmont, County Cork, Ireland, 1847. He went to sea from 1858 to 1872; and in the latter year settled in San Francisco, becoming foreman of a gang of stevedores and later going into the draying business independently. In 1877 he began an agitation among the workingmen, his attacks being directed mostly against the rights of capital and the importation of Chinese labor. Large mass-meetings were held in the so-called "Sand Lots" near the city, and the movement grew rapidly in power and importance, but dominated entirely by Kearney. Finally he was able to pack a convention which adopted a new State constitution in the interests of his movement, and very detrimental to capital and property interests. In 1878 he visited the Eastern States, speaking in the large cities, but failed to gain an important following; on his return to California he gradually lost his influence and his party sank into obscurity.

Kearney, Neb., city, county-seat of Buffalo County; on the Burlington & M. R., the Union

Pa., and the Kearney & B. H. R.R.'s; about 125 miles west of Lincoln and 175 miles, in direct line, southwest of Omaha. Kearney is midway between the eastern and western coasts of the United States. The first settlement was made in 1871; it was incorporated in 1872, and received its city charter in 1889. It is in the midst of a rich agricultural region noted for wheat and live-stock. The chief industrial establishments are a furniture factory, three cigar factories, and large brick yards. The city is the seat of a State Industrial School for Boys, a State Normal School (1903), a Military Academy under the auspices of the Episcopal Church, a high school, and a public library. It has three banks, the combined capital of which is \$200,000. The government is vested in a mayor who holds office two years, and in a council of eight members, elected annually. Pop. (1900) 5,634; (1904) 7,000.

F. L. WHEDON,

Editor 'The Kearney Democrat.'

Kearns, Thomas, American politician: b. near Woodstock, Ont., 11 April 1862. He attended the public schools until his father's removal to Holt County, Nebraska, in 1872, then worked on the home farm till he was 14. After several years spent as a freighter in Nebraska he removed to Utah in 1883, where he worked at first as a miner, becoming subsequently one of the owners of the Mayflower and Silver King mines. He was a member of the common council of Park City, Utah, in 1895, and was a delegate to the National Republican convention the next year. He was also a delegate to the Philadelphia convention in 1900, and was elected a member of the United States Senate in 1901. He is largely identified with the mining interests of Utah and is one of the owners and projectors of the Salt Lake, San Pedro and Los Angeles railroad which runs from Salt Lake City, Utah, to Los Angeles, Cal.

Kearny, Lawrence, American naval officer: b. Perth Amboy, N. J., 30 Nov. 1789; d. there 29 Nov. 1868. Having entered the navy in 1807, he was active in the defense of the coast of South Carolina and States adjacent during the War of 1812, and in 1826 in command of the Warren effectually put an end to the depredations of the Greek pirates in the Levant. Promoted captain (1832), he was assigned (1841) to the command of the East India squadron, and began the negotiations for a commercial treaty between China and the United States, later concluded by the special envoy, Cushing. On his return voyage to the United States, Kearny stopped at the Hawaiian Islands to protest against the contemplated transfer of the islands to Great Britain. In 1867 he was made commodore on the retired list.

Kearny, Philip, American soldier: b. New York 2 June 1815; d. near Chantilly, Va., 1 Sept. 1862. He was graduated from Columbia in 1833, studied law, but in 1837 entered the United States army as lieutenant of the 1st dragoons, and in 1830–40 was in Europe for the study of the cavalry service of the French army, with which he fought in the Algerine war. In 1841 he was on the staff of Gen. Scott, in 1846 resigned from the army, but soon afterward enlisted for the Mexican War, fought at Contreras and Churubusco, and at the close of the latter engagement charged and pursued into Mexico

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City the retreating enemy. He again resigned from the army in 1851, in 1859 entered the French service, and participated in the war in Italy, where he fought at Solferino. On 17 May 1861, he was appointed brigadier-general in the Union service, and given command of the 1st New Jersey brigade in the Army of the Potomac. Later he was assigned to the command of the cavalry of that army, and served conspicuously in the Peninsula. He was commissioned major-general of volunteers 7 July 1862, took part in the second Bull Run, and subsequently at Chantilly was shot while reconnoitering. Kearny was a brilliant cavalry leader, termed by Scott "the most perfect soldier" he ever knew. Consult: De Peyster, 'Personal and Military History of Philip Kearny' (1869).

Kearny, Stephen Watts, American general; b. Newark, N. J., 30 Aug. 1794; d. St. Louis, Mo., 31 Oct. 1848. He entered the United States army in 1812 as lieutenant, and distinguished himself in the action at Queenstown Heights in the same year. He served throughout the war, and became, in June 1846, a brigadier-general. At the commencement of the Mexican War he commanded the "Army of the West," which marched from Bent's Fort on the Arkansas westward, and conquered New Mexico. Having established a provisional civil government in Santa Fé, he proceeded to California, and participated with his command in the battle of San Pascual, in December 1846. For his services in this campaign he was appointed brevet major-general, his commission being dated from the battle of San Pascual. He was governor of California from March to June 1847, but subsequently joined the army in Mexico, where he continued until the close of the war. He wrote: 'Manual for the Exercise and Maneuvering of United States Dragoons' (1837); 'Organic Law'; 'Laws for the Government of New Mexico' (1846).

Kearny, N. J., town in Hudson County, on Newark Bay, between the Passaic and Hackensack rivers, and on the Pennsylvania, the Lehigh V., the Erie, and the Delaware, L. & W. R.R.'s; opposite the city of Newark. The first permanent settlement was made in 1765, by Germans, and the place was called New Barbadoes. Later it became a part of Harrison, but in 1871 it was incorporated and named in honor of Gen. Philip Kearny (q.v.) who once lived in the place, and whose residence still stands within the limits of the town. It has several manufacturing establishments, the chief of which are the Nairn Linoleum works with 1,200 employees; the Arlington Company Celluloid works, 1,000 employees; and the Marshall Thread Company, 2,000 employees. Other manufactures are golf balls, metal bedsteads, roofing material, and brass novelties. The town has a State Soldiers' Home, the Sacred Heart Industrial School for Boys, public and parish schools, and nine churches. In Arlington, or the third and fourth wards, there are many fine residences with large and well kept grounds. The government is vested in an alderman-at-large, practically a mayor without veto power, and a council of eight members, elected every two years. Pop. (1900) 10,896.

W. J. KEEGAN,
Editor of West Hudson (Press.)

Kearsarge, kēr'sārj, the name of two mountain peaks of the White Mountains. (1) Mount Kearsarge in Carroll County, N. H., is 3,260 feet in height. The Federal vessel which sank the Confederate cruiser Alabama was named after this mountain. (2) Kearsarge Mount, in Merrimac County, N. H., is 2,943 feet in height. This mountain was once called Kyar-Sarga.

Kearsarge, The, a ship of the United States navy which played a conspicuous part in the only sea-fight of the Civil War. See ALABAMA, THE.

Keary, kē'rī, Annie, English novelist: b. Bitton near Wetherby, Yorkshire, 3 March 1825; d. Eastbourne, Sussex, 3 March 1879. Beginning a literary career with books for children, she made her reputation with stories of Irish life and became very popular, 'Castle Daly' (1875) being her best work. Among other fictions by her are: 'Clemency Franklyn' (1866); and 'A Doubting Heart,' left unfinished at her death and completed by Mrs. Katharine Macquiod. She also published such historical works as 'Early Egyptian History'; and 'The Nations Around.'

Keary, Charles F., English novelist and antiquarian writer. He was educated at Cambridge University and beside the novels 'A Mariage de Convenience' (1889); 'Herbert Vanlennert' (1895); 'High Policy' (1902); etc., has published 'Outlines of Primitive Belief' (1882); 'The Mythology of the Eddas' (1882); 'The Vikings in Western Christendom' (1890); 'Norway and the Norwegians' (1892); 'Riegel: an Autumn Mystery' (1903).

Keasbey, kēz'bē, Lindley Miller, American political economist: b. Newark, N. J., 24 Feb. 1867. He was graduated from Harvard in 1888 and went abroad to study at Strasburg. He was appointed professor of political science at the University of Colorado in 1892, where he remained for two years, and in 1894 became professor in the same department at Bryn Mawr. He has written a number of monographs and magazine articles, also 'The Nicaragua Canal and the Monroe Doctrine' (1896); and has translated 'The Economic Foundations of Society' from Loria.

Keats, kēts, Gwendoline, "ZACK," English novelist: b. Devonshire. She first attracted notice by a series of dialect tales appearing in 'Blackwood's Magazine,' and in 1898 acquired sudden fame by her volume, 'Life is Life,' consisting of 12 stories delineating with skill and vigor the more painful and hopeless side of existence. Later books by her include: 'On Trial' (1899); 'Tales of Dunstable Weir' (1900); 'The White Cottage' (1901).

Keats, John, English poet: b. Moorfields, London, 31 (29?) Oct. 1795; d. Rome, Italy, 23 Feb. 1831. He studied in John Clarke's school at Enfield, was apprenticed (1810) for five years to a surgeon at Edmonton, broke his indentures (1814), continued his surgical studies in the London hospitals of St. Thomas' and Guy's, was appointed dresser at the latter (1816), but soon afterward relinquished his professional work, and turned to literature, aided by Leigh Hunt, who published some of his verse in the 'Examiner.' In 1817 appeared his volume 'Poems, by John Keats,' containing

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work of much promise, but quite unrecognized by the public. This he followed in 1818 by 'Endymion,' a volume whose obvious defects explained though they could not justify the bitter critical attacks in 'Blackwood's Magazine' (it is supposed by Lockhart) and the 'Quarterly Review' (by J. W. Croker), whose vulgar abuse was extreme even for those times. Keats continued his poetical work, however; collaborated with Charles Armitage Brown in the tragedy of 'Otho the Great,' and in 1820 published 'Lamia, Isabella, the Eve of St. Agnes, and other Poems,' on which volume his reputation as one of the great English poets is based. Already stricken with consumption, he sailed for Italy September 1820, and there died at Rome, where he was buried in the Protestant cemetery. His best work in its structure and content evinces an ease and a fulness of imagination similar to that of the great Elizabethans; and though he knew no Greek, he seized by intuition the Greek spirit. At times in his earlier experiments he is intricate, fantastic, and unhappy in diction. The best edition of his poems is by H. B. Forman (1889). Consult also: R. M. Milnes, 'Life, Letters and Literary Remains of John Keats' (new ed. 1867); Clarke, 'Recollections of John Keats' in 'Recollections of Writers,' by C. and M. C. Clarke (1878); the 'Life' by W. M. Rossetti (1887); and that by Colvin (1891) in the 'English Men of Letters' series; Goethein, 'John Keats Leben und Werke' (1807); H. C. Shelley, 'Keats and His Circle' (1902).

Keble, kēbl, John, English Anglican clergyman and poet: b. Fairfield, Gloucestershire, 25 April 1792; d. Bournemouth, Hampshire, 29 March 1866. He was educated at Corpus Christi College, Oxford, and took his degree in 1811 with high honors. Going to Oriel as a fellow, he became college tutor and public examiner, and in 1831–41 was professor of poetry. He took priest's orders in 1816 and was his father's curate for some time. He was appointed vicar of Hursley, near Winchester, in 1836, a position which he held until his death. To the world at large he is best known as the author of the famous volume of religious verse, 'The Christian Year' (q.v.). He also wrote the 'Lyra Innocentium,' and, with Newman and others, the 'Lyrica Apostolica.' He was a zealous High Churchman, and wrote several of the celebrated 'Tracts for the Times' (1833). Keble College, Oxford, was founded as a memorial of him. Consult: 'Lives' by J. T. Coleridge (1869), and Lock (1892); Yonge, 'Musings over the Christian Year' and 'Lyra Innocentium'; Shairp, 'Studies in Poetry and Philosophy' (1868); Newman, 'Apologia pro Vita sua' (1864); Yonge, 'John Keble's Two Parishes' (1898).

Keble College, one of the colleges of Oxford University, built by subscription as a memorial of the Rev. John Keble, and incorporated in 1870 by royal charter.

Ked'die, Henrietta, "SARAH TYTLER," Scottish novelist: b. Cupar, Fifeshire, 4 March 1827. From 1848 to 1870 she was joint owner of a girls' school in her native place, and from 1870 to 1884 was engaged in literary work in London. She has since resided in Oxford. Her best work is 'Citoyenne Jacqueline' (1865), a

well-told story of the French Revolution. Among other works of hers are: 'Papers for Thoughtful Girls' (1862); 'St. Mungo's City' (1885); 'Six Royal Ladies of the House of Hanover' (1898); 'Women Must Weep' (1901); 'Three Men of Mark' (1901).

Ked'ney, John Steinfort, American Episcopal clergyman: b. Essex County, N. J., 12 Feb. 1819. He was graduated from Union College in 1838 and from the General Theological Seminary, New York, in 1841. After taking orders in the Episcopal Church he was rector of several churches until 1871, when he became professor of divinity in Seabury Divinity School, Faribault, Minn. He has published: 'Catawba River and Other Poems' (1846); 'The Beautiful and the Sublime' (1884); 'Hegel's Ästhetics' (1886); 'Christian Doctrine Harmonized' (1888); 'Mens Christi' (1890); 'Problems in Ethics' (1899).

Keefer, kē'fér, Samuel, Canadian engineer: b. Thorold, Ontario, 22 Jan. 1811. He is a brother of T. C. Keefer (q.v.). In 1841–53 he was chief engineer of the government board of public works, in 1853 was appointed resident engineer of the Grand Trunk railway, and in 1857–64 was government inspector of railways and deputy commissioner of public works. He completed in 1869 the Niagara Falls suspension bridge, then the longest existing single-span structure. His design and description of the bridge received a gold medal at the Paris exposition of 1878.

Keefer, Thomas Coltrain, Canadian engineer: b. Thorold, Ontario, 4 Nov. 1821. He is a brother of Samuel Keefer (q.v.). He was educated at Upper Canada College (Toronto), began practice as a civil engineer in 1838, and in 1850 was appointed by the government to survey the rapids of the St. Lawrence and explore the region between the headwaters of the St. John and the St. Lawrence. In 1851 he became engineer-in-chief of the Toronto and Kingston section of the Grand Trunk railway, and made surveys at Montreal for the present Victoria bridge across the St. Lawrence. He was chief commissioner for Canada at the Paris exposition of 1878. He wrote: 'The Philosophy of Railways' (1849); and an essay on 'The Influence of the Canals of Canada on her Agriculture' (1850), which won a prize offered by the Earl of Elgin.

Keeler, kē'lér, James Edward, American astronomer: b. La Salle, Ill., 10 Sept. 1857; d. San Francisco, Cal., 12 Aug. 1900. He was graduated from the Johns Hopkins University in 1881, was appointed assistant to Prof. S. P. Langley (q.v.) in the Mount Whitney (Cal.) expedition (1881), was in 1881–3 at the Allegheny Observatory, and after study in Germany (1883–4), was appointed assistant at Lick Observatory (1886), and later astronomer there (1888). In 1891–8 he was active at the Allegheny Observatory as its director and professor of astrophysics in the Western University of Pennsylvania, and from 1898 until his death was director of the Lick Observatory. His spectroscopic work included valuable studies of the nebula in Orion and of Saturn's rings.

Keeley, kē'lí, Leslie E., American physician: b. in 1842; d. Los Angeles, Cal., 21 Feb. 1900. He was graduated at Rush Medical Col-

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lege (Chicago) in 1863, was a surgeon in the Federal army during the Civil War, practised medicine at Dwight, Ill., there opened (1880) a sanitarium for the cure of inebriety and the use of narcotics, and later established branches. His system was based on a secret compound said by him to contain bichloride of gold, and hence called the "gold" cure. He published "The Morphine Eater" (1881).

Keely, John Ernest Worrell, American adventurer: b. Philadelphia, Pa., 3 Sept. 1837; d. there 18 Nov. 1898. In early life he was a carpenter. Prior to 1872 he became interested in music, and afterward claimed that the tuning-fork had suggested to him a new motive power. In 1874 a stock company was formed for the purpose of supplying funds for the perfection and promotion of the alleged discovery. Keely built and destroyed many models, gave exhibitions at which numerous remarkable and unexplained effects were produced, but never attained any important result. Upon his death it was found that the so-called Keely motor was operated by an invisible compressed-air apparatus, and that the entire scheme was fraudulent.

Keely Motor. See KEELY, J. E. W.

Keen, kēn, William Williams, American surgeon: b. Philadelphia 19 Jan. 1837. He was graduated at Brown University in 1859, and from Jefferson Medical College in 1862; and during the Civil War period was an assistant surgeon in the Federal army. He then studied in Europe 1864-6, was at the head of the Philadelphia School of Anatomy 1866-75; and at the same time lecturer on pathological anatomy at Jefferson Medical College. From 1875 to 1890 he was professor of artistic anatomy at the Pennsylvania Academy of Fine Arts and also of surgery at the Women's Medical College 1884-9, and of surgery at Jefferson Medical College. His specialty was the surgery of the nervous system. In 1890 he published experiments with the injection of filtered air for determination of rupture of the bladder and in 1891 proposed relieving spasmodic wryneck by the extsection of the nerves supplying the posterior rotator muscles of the head. He has published: "Keen's Clinical Charts" (1870); "Early History of Practical Anatomy" (1870); etc., and became honorary fellow of the Royal College of Surgeons of England in 1900.

Keenan, kē'nān, Henry Francis, American novelist: b. Rochester, N. Y., 4 May 1850. He served in the Federal army during a portion of the Civil War, and was engaged in journalistic work 1868-82. He has published: "The Money Makers: a Social Problem"; "Trajan"; "The Aliens"; "The Iron Game"; "The Players."

Keene, kēn, James Robert, American stock speculator: b. London, England, 1838. He went to California in 1852, was a miner in that State and Nevada, later was a speculator in mining stock at San Francisco, during the so-called "bonanza" period acquired \$6,000,000, and for a time was president of the San Francisco stock exchange. In 1877 he established himself in New York as a Wall Street operator, soon became known for his energetic manipulations on "Change, and since then has lost and made several fortunes.

Keene, Laura, American actress and manager: b. England 1820; d. Montclair, N. J., 4 Nov. 1873. Her real name was Mary Moss, and as "LAURA KEENE" she had become famous in England in the role of Pauline in "The Lady of Lyons" before coming to the United States in 1852, where she made her home the remainder of her life. She was for a time manager of the Varieties Theatre in New York, and 1855-63 was lessee of the Olympic, at first called "Laura Keene's Theatre." She was married to H. W. Taylor in 1847, and to J. Lutz ten years afterward. The most noted play produced by her was "Our American Cousin," brought out in 1858 with Jefferson and Sothern in the cast. While he was witnessing this play at Ford's Theatre in Washington, President Lincoln was assassinated.

Keene, N. H., city, county-seat of Cheshire County; on the Ashuelot River, and on the Boston & M. and the Fitchburg R.R.'s; about 45 miles southwest of Concord and 43 miles west of Manchester. Mount Monadnock is 10 miles from the city. The city, known as Upper Ashuelot, was settled in 1734 and incorporated in 1753 when it took the name of Keene. It received its city charter in 1874. The chief industrial establishments are the repair-shops of the Boston & Maine railroad, sash, door, and blind factories, furniture, pail and tub, and chair factories, glue works, pottery, woolen-mill and shoe factory. Nearly 2,000 persons are employed in the factories. The annual output of manufactured goods is about \$2,000,000. The products of the fertile farms of the vicinity add to the wealth of the city. Pop. (1890) 7,446; (1900) 9,165.

Keener, kē'nēr, John Christian, American Methodist bishop: b. Baltimore 7 Feb. 1819. After entering the Methodist ministry in 1841 he preached in Alabama till 1848 and was pastor and presiding elder in New Orleans 1848-61. He edited the "New Orleans Christian Advocate" (1865-70), and in the year last named was appointed a bishop of the Methodist Church, South. He has published: "Studies of Bible Truths" (1899); "The Garden of Eden and the Flood" (1900).

Keesoo, or Teeso, the flowers of certain species of *Butea* (q.v.).

Keewatin, kē-wā'tīn, a district of Canada lying west and south of Hudson Bay, and extending from Ontario and Manitoba north to the Arctic Ocean. Its area is 756,000 square miles. The greater part of the surface is hilly and somewhat mountainous, but there are no high peaks or ranges. The northern part of Lake Winnipeg and its outlet, Nelson River, are in Keewatin. There are a large number of small lakes, all of which belong in the basin of Hudson Bay. The Severn, Churchill, and Ferguson rivers cross the district and enter Hudson Bay. There is considerable fertile land, but the climate is too cold for luxuriant vegetation. In the south there are large forests of pine, spruce, and other trees. Some valuable minerals have been found, gold and copper, but the mines have not been developed. Hunting, lumbering, and fishing are the chief occupations. The inhabitants of the north are chiefly Eskimos. York Factory, at the mouth of the Nelson River, Fort Churchill, at the mouth of the

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Churchill River, Norway House, on Lake Winnipeg, and a number of other places in Keewatin are trading stations of the Hudson Bay Company and its successors in the fur business of Canada. All are small settlements. The fisheries at Lake Winnipeg attract a colony a part of the year.

The name of the district comes from the Indian word kewatin, which means "northwest wind." The lieutenant-governor of Manitoba is the chief executive of this territory, and has had control since the erection of the district, 12 April 1876.

Keifer, ki'fér, Joseph Warren, American politician: b. Clark County, Ohio, 30 Jan. 1836. He was graduated from Antioch College; and in 1856 went to Springfield, Ohio, where he studied law, being admitted to the bar in 1858. At the outbreak of the Civil War he entered the volunteer service as major and rose to the rank of major-general; he was four times wounded; in 1866 he declined an appointment as lieutenant-colonel in the United States army. He was a member of the Ohio State senate in 1868-9; was delegate to the Republican national convention in 1876, and was elected to Congress in that year, serving till 1885; while from 1881 to 1883 he was speaker of the House. Since 1873 he has been president of the Lagona National Bank in Springfield; he has also been prominent in the Grand Army, being department commander in Ohio (1868-70) and vice-commander-in-chief of the national organization in 1871-2. In 1898 he served as major-general of volunteers in the Spanish War, his command being located near Havana. He has written 'Slavery and Four Years of War' (1900).

Keith, kēth, George, Scottish Quaker: b. probably in Aberdeenshire about 1639; d. Edburton, Sussex, England, 27 March 1716. He was educated at Marischal College, Aberdeen; became a Quaker in 1662, and was several times imprisoned for his preaching. In 1677 he accompanied George Fox and William Penn to Holland on a missionary journey; came to Philadelphia in 1680; and was there accused of heresy and interdicted from preaching in 1692. He then held separate meetings of his followers, known first as Keithites and later as "Christian Quakers," and came to London to defend his views. Disowned by the yearly meeting of 1694, he established a congregation in which the Quaker externals were observed but the Lord's Supper and baptism were administered. In 1700 he conformed to the Anglican Church, in 1702-4 was a missionary in America for the Society for the Propagation of the Gospel, and from 1705 until his death was rector of Edburton, Sussex. Among his writings were: 'The Deism of William Penn and his Brethren' (1699); 'The Standard of the Quakers Examined' (1702); and 'A Journal of Travels' (1706).

Keith, Sir William, English administrator in America: b. near Peterhead, England, 1680; d. London 18 Nov. 1789. He was for a time surveyor-general of the customs for the southern district of North America; in 1717 became lieutenant-governor of Pennsylvania and the three lower colonies (the present Delaware), of which Penn was titular governor; established a high court of chancery abolished in 1735; on Penn's death and the ensuing difficulties took the side of the people; and later was superseded. His

conduct had been treacherous to the proprietary authority, but he had many adherents. He was twice elected to the assembly, but in 1728 went to England and presented to the king 'A Short Discourse on the Present State of the Colonies in America.' He also wrote a 'Colonial History of Virginia' (1738), and a volume of essays (1740).

Keller, kēl'lér, Gerard, Dutch writer: b. Gouda 13 Feb. 1829. His best works are his books of travel, including: 'A Summer in the North' (1861); 'A Summer in the South' (1864); 'Paris Besieged' (1871); 'Murdered Paris' (1872); 'Europe Sketched in All her Glory' (1877-80); 'America in Image and in Writing' (1887). Among his numerous novels may be named: 'Within and Without' (1860); 'From Home' (1867); 'Over-Perfect' (1871); 'The Privy Councillor'; 'In Our Days' (1880); 'Our Minister' (1883); 'Flickering Flames' (1884); 'Nemesis' (1885). He is the author also of books for the young, and several dramas.

Keller, Gottfried, German poet and novelist: b. Zurich 19 July 1819; d. there 16 July 1890. Original in execution, he was a keen observer, genuinely artistic, and with a strong sense of humor, sometimes extravagantly indulged. In his best vein he goes straight to the heart. To romanticism in *motifs*, processes, and characters, he joined realism in execution. Among his works may be cited: 'Der grüne Heinrich' (1854, 16th ed. 1897), his first novel and one of his best; 'Seldwyla Folk,' a collection of short stories (1850); 'Romeo und Julie auf dem Dorfe' (1876); 'Martin Salander' (1886). His collected poems appeared in 1883. By critics Keller is ranked among the best of German novelists. Consult: Brahm, 'Gottfried Keller' (1883); Köster, 'Gottfried Keller' (1900).

Keller, Helen Adams, an American woman famous for intellectual progress in spite of being a blind deaf-mute: b. Tuscumbia, Ala., 1880. Consult autobiography, 'The Story of My Life' (1903); Chamberlain, 'Helen Keller as She Really Is.' See DEFECTIVES, EDUCATION OF.

Kellermann, François Christophe, frānswā krēs-tōf kēl'lér-mān (originally GEORG MICHAEL KELLERMANN), Duke of Valmy, French marshal: b. Wolfsbuchweiler-an-der-Tauber, Bavaria, 28 May 1735; d. 12 Sept. 1820. He entered the Conflans Legion as a hussar in 1752, and engaged in the first campaigns of the Seven Years' War. In 1792 he received the command of the army of the Moselle, formed a junction in September with the main army under Dumouriez, and sustained 20 Sept. 1792 the celebrated attack of the Duke of Brunswick. This "cannonade of Valmy" caused the allies to retreat, and perhaps decided, not merely the whole campaign, but also the fate of Europe, and the supremacy of France, till 1813. In the following wars of France Kellermann received various general commands. He became marshal of France in 1804 and Duke of Valmy in 1809. After the restoration of the Bourbons he was appointed a member of the chamber of peers, where he espoused the Liberal side.

Kelley, kēl'i, Benjamin Franklin, American soldier: b. New Hampton, N. H., 10 April



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HELEN KELLER, HER INSTRUCTOR AND JOSEPH JEFFERSON.

KELLEY — KELLOGG

1807; d. Oakland, Md., 17 July 1891. In 1861 he recruited and became colonel of the first Virginia regiment enlisted in the Federal service, on 17 May became brigadier-general, captured Romney 26 October and was for a time, until January 1862, commander of the department of Harper's Ferry and Cumberland. In July 1863, he was appointed to command the department of West Virginia, in November 1863 destroyed the Confederate camp near Morefield, Va., and in August 1864 defeated the enemy at Cumberland, Md., and New Creek and Morefield, Va. He was brevetted major-general of volunteers in 1865, and subsequent to the war was from 1876 superintendent of the Hot Springs (Ark.) reservation, and from 1883 an examiner of pensions.

Kelley, Edgar Stillman, American composer: b. Sparta, Wis., 14 April 1857. He was graduated from the Stuttgart Conservatory of Music in 1880, and returning to this country settled in San Francisco, composing there incidental music to 'Macbeth.' He removed later to New York, where he became special instructor in composition in the New York College of Music, and where his opera, 'Puritan,' was produced in 1892. He has also composed an orchestral suite 'Aladdin' symphony; music to 'Prometheus Bound'; music for dramatic production of 'Ben Hur' (1899); etc.

Kelley, James Douglas Jerrold, American naval commander: b. New York 25 Dec. 1847. He was graduated from the United States Naval Academy in 1868; became lieutenant-commander in 1893 and commander in 1899. He has published: 'The Question of Ships'; 'Our Navy'; 'American Men-o'-War'; 'History of the Naval Experimental Battery'; 'The Navy of the United States'; and is the naval editor of the *New York Herald*.

Kelley, William Darragh, American legislator: b. Philadelphia, Pa., 12 April 1814; d. Washington, D. C., 9 Jan. 1890. He was apprenticed first to a jeweler and later to a printer, studied law at Philadelphia and in 1841 was admitted to the bar there, in 1845–6 was attorney-general of Pennsylvania, and in 1846–56 judge of the court of common pleas at Philadelphia. Previously a Democrat, he became a Republican in 1854, and in that year gave at Philadelphia a once well-known address on 'Slavery in the Territories.' In 1860 he was a delegate to the national Republican convention, and from that year until his death was a member of the House of Representatives, where he was chairman of the Committee on the Centennial Exposition and was known as 'Pig-iron Kelley.' For some years he was senior of the House. Among his publications are: 'Letters on Industrial and Financial Questions' (1872); 'Letters from Europe' (1880); 'The New South' (1887).

Kellogg, kĕl'ōg, Amas Monkham, American educator: b. Utica, N. Y., 5 June 1832. He was graduated from the Albany (N. Y.) State Normal School in 1851 and was instructor there 1852–6. Since then he has held other educational posts and has edited the 'School Journal' from 1874. He has published: 'School Management'; 'Life of Pestalozzi' (1891); 'How to be a Successful Teacher' (1901), etc.

Kellogg, Clara Louise, American opera singer: b. Sumterville, S. C., 12 July 1842. She obtained her musical education chiefly in New York, where her first appearance in opera was in 1861 at the Academy of Music, in the role of Gilda in 'Rigoletto.' Henceforward she was one of the most popular of American singers, and was also most cordially received in England, where she sang in opera 1867–8 and again in 1872 with Christine Nilsson. Her voice was a pure and flexible soprano and her execution brilliant. She had an extensive repertoire, including 45 operas. In 1874 she organized an English opera company and with it visited nearly every part of the United States. In 1876 she organized an Italian opera company and later appeared on the concert stage. In 1887 she married her manager, Carl Strakosch, and soon after retired from professional life.

Kellogg, Edgar Romeyn, American soldier: b. New York 25 March 1842. He served through the Civil War in the Federal army, and was distinguished for bravery at Murfreesboro, during the Atlanta campaign, and at Jonesboro. He commanded the 10th United States Infantry at the battle of San Juan Hill, Cuba, 1 July 1898, and was appointed brigadier-general, United States army in the following October.

Kellogg, Elijah, American Congregational minister and writer for the young: b. Portland, Maine, 20 May 1813; d. Harpswell, Maine, 17 March 1901. He was graduated from Bowdoin College in 1840, from the Andover Theological Seminary in 1843, was pastor of the Congregational Church at Harpswell, Maine, in 1844–55, in 1855–65 was chaplain of the Boston (Mass.) Seamen's Friend Society, was later for a time in charge of a congregation at Rockport, Mass., but soon returned to Harpswell, and there devoted himself to literary work. He published over a score of juveniles, including 'The Elm Island Series' (1868–70); 'Pleasant Cove Series' (1870–4), and 'Good Old Times Series' (1877–82). But he is best known for his familiar blank verse addresses, 'Spartacus to the Gladiators,' 'Regulus to the Carthaginians,' and 'Pericles to the People.' Consult Mitchell, 'Elijah Kellogg: the Man and His Work' (1903).

Kellogg, George, American inventor: b. New Hartford, Conn., 19 June 1812; d. there 6 May 1901. Albert Kellogg, the botanist (q.v.), was his brother. He was graduated from Wesleyan University in 1837, in 1841 became a manufacturer in Birmingham, Conn., removed in 1855 to New York, was a United States revenue officer in 1863–6, and later was active in manufacturing and experimentation at Cold Spring, N. Y. Among his inventions were a machine for the manufacture of jack-chain, with a capacity of a yard per minute; a type-distributer; an adding apparatus; and a dovetailing machine.

Kellogg, Martin, American Latinist and educator: b. Vernon, Conn., 15 March 1828; d. San Francisco 26 Aug. 1903. He was graduated from Yale in 1850, from the Union Theological Seminary in 1854; having removed to California about 1855 there held a pastorate at Grass Valley, Nevada County; was professor of Latin and mathematics in the College of California (1860–9); and when the college was merged into

KELLOGG — KELLY

the university held the chair of Latin and Greek in the latter institution in 1869–76. In 1876–94 he was professor of Latin language and literature, in 1890–3 acting president, and in 1893–9 president of the university. He resumed his professional duties in 1900. He published: ‘*Ars Oratoria*,’ an edition of selections from Cicero and Quintilian (1872), and ‘*The Brutus of Cicero*’ (1889).

Kellogg, Samuel Henry, American Presbyterian missionary and scholar: b. Quogue, Long Island, N. Y., 6 Sept. 1839; d. Landour, India, 2 May 1899. He was graduated at Princeton College in 1861 and at the Theological Seminary in 1864, and after being ordained to the Presbyterian ministry, went as a missionary to India, where he remained till 1877. He was professor of systematic theology in Western Theological Seminary 1877–86, and pastor of St. James’ Square Presbyterian Church, Toronto, 1886–92. He returned to India in 1892 and remained there till his death. His publications include ‘*A Grammar of the Hindi Language*’ (1876); ‘*The Jews: or, Prediction and Fulfilment*’ (1883); ‘*The Light of Asia and the Light of the World*’ (1885); ‘*The Genesis and Growth of Religion*’ (1892); ‘*From Death to Resurrection*’ (1885); etc.

Kellogg, William Pitt, American lawyer and politician: b. Orwell, Vt., 8 Dec. 1831. He was educated at the Norwich Military Institute and removed to Illinois, where he studied law. Being admitted to the bar in 1852 he began his practice at Canton. He became active in the Republican party, was a delegate to the national convention in 1860, and one of the presidential electors in the same year, voting for Lincoln. In 1861 the President appointed him chief justice of the Territory of Nebraska, but later granted him leave of absence that he might raise a regiment of cavalry in Illinois, of which he became colonel. He remained in the army two years, serving in the Missouri campaign with Pope, but was compelled to resign on account of ill health. He was collector of the port at New Orleans (1865–8); was elected senator from Louisiana in 1868; was then elected governor of the State in 1873, serving till 1876, when he was again elected senator. At the expiration of his term as senator he was elected to the House of Representatives, where he remained till 1885. He has been a delegate to every Republican national convention from 1860 to 1896.

Kel'ly, Edmond, American municipal reformer: b. Toulouse, France, 28 May 1852. He was educated in early years in England and after graduation at Columbia Law School in 1877, was called to the bar. In 1884 he was admitted to the French bar and practised in Paris till 1890, and was counsel for the American legation at Paris. He has been conspicuous in recent efforts to improve the municipal administration of New York. He is the author of ‘*Evolution and Effort, and their Relation to Religion and Politics*’ (1898); and ‘*Government; or, Human Evolution*’ (1901).

Kelly, James Edward, American sculptor: b. 30 July 1855. He studied at the National Academy of Design, and up to 1881 was known as an illustrator of books and magazines. Since that time he has successfully devoted himself to sculpture, and chosen subjects from

American history for treatment by his patriotic chisel; so great has been his success that he has won the title of ‘Sculptor of American History.’ His well known works include ‘Sheridan’s Ride’ (1878); ‘Paul Revere,’ a statuette (1882); ‘Monmouth Battle Monument,’ with five illustrative panels (1883–5); groups for the ‘Saratoga Monument’ (1887); ‘Grant at Fort Donelson’ (1886); ‘General Devens’ and the ‘Sixth New York Cavalry Monument’ at Gettysburg (1890); ‘Call to Arms’; colossal figure for the Troy ‘Soldiers’ Monument’ (1891); ‘Buford Monument’ at Gettysburg (1895); ‘Battle of Harlem Heights’ (executed for the Sons of the Revolution at Columbia University, 1897); and a colossal monument to commemorate the defense of New Haven. A remarkable series of military portraits has also been produced by him. Forty generals of the Civil War, including Grant, Sherman and Sheridan, gave sittings for the sculptor. A series illustrating the leading generals and admirals of the Spanish-American War has followed, witnessing to his skill and industry as a portrait sculptor. Wheeler, Dewey, and Sampson are included in this latter gallery of busts.

Kelly, John, American politician: b. New York 21 April 1821; d. there 1 June 1886. After a public school education, he was apprenticed to the mason’s trade, in 1845 established a successful business of his own, was elected alderman in 1854, in 1855–9 was a Democratic representative from New York in the 34th and 35th Congresses, and in 1859–62 and 1865–7 was sheriff of New York County. In 1868 he was the candidate of the Democratic Union for mayor, but was defeated by Oakey Hall; and in 1871 assisted Charles O’Conor, Samuel J. Tilden and others in the reorganization of Tammany Hall which followed the Tweed “ring” troubles. He became comptroller of New York in 1876, but was removed in 1879 by Mayor Cooper. In 1878 he caused the city delegates to bolt the Democratic State convention of that year, and was himself nominated for governor by the bolters on an independent ticket in opposition to Robinson, the regular candidate. He received 77,566 votes, and thus caused the election of Alonzo B. Cornell, Republican. In 1885 and 1886 he was chairman of the Tammany Hall general committee. See TAMMANY HALL.

Kelly, William, American inventor: b. Pittsburgh, Pa., 22 Aug. 1811; d. Louisville, Ky., 11 Feb. 1888. He early turned his attention to invention, engaged in the forwarding and commission business at Pittsburgh, Pa., and from 1846 in the iron business in Kentucky. In 1851 he finally perfected his process in decarbonizing iron by means of a current of air, and thus by a converter directly transforming pig-iron into steel. This method, “Kelly’s air-boiling process,” was the same as that patented by Sir Henry Bessemer in England in 1856 (or 1857), and Kelly asserted that Bessemer had gained knowledge of it through American workmen. Bessemer’s application in the United States was refused, and the patent awarded to Kelly. Kelly’s interests were safeguarded by a syndicate, and steel was first manufactured under his patents in the foundry at Wyandotte, Mich. He is said to have introduced Chinese labor into the United States.

KELLY'S FORD — KEMBLE

Kelly's Ford, Engagements at. This point on the Rappahannock River six miles above its junction with the Rapidan and about five miles below Rappahannock Station, was the scene of several engagements between the Federals and Confederates during the Civil War. In August 1862, the Union cavalry of the Army of Virginia had a spirited encounter with the Confederate cavalry, and 17 March 1863 Gen. Averell with 2,100 Union cavalry and a battery of six guns, crossed at the ford, after a sharp engagement, and moved on Culpeper Court House, under orders to rout and destroy Fitzhugh Lee's cavalry brigade, reported at that place. Lee was found in his immediate front with five regiments and a battery, and when about noon Averell advanced, a hard fight ensued, during which Lee was gradually forced back over a mile; then Averell was checked, finally driven back, and recrossed the river at dark. It was the first purely cavalry battle of the War, and was closely contested on both sides. The Union loss was 65 killed and wounded and 22 missing; the Confederate loss, 90 killed and wounded and 34 missing. Among the Confederate killed was Captain John Pelham, a young artillerist of much promise. A portion of Pleasonton's cavalry division crossed the ford and took part in the battle of Fleetwood (q.v.) 9 June 1863. When Gen. Meade began his Mine Run campaign (see MINE RUN) two corps of the Army of the Potomac under Gen. Sedgwick forced the passage of the Rappahannock at the railroad crossing, 7 Nov. 1863, while Gen. French, with two corps, forced the passage at Kelly's Ford, five miles below. The advance of the Third corps crossed with a loss of 36 killed and wounded, the Confederate loss being 64 killed and wounded and 205 captured, and the Army of the Potomac was united at Brandy Station. Preceding and following these engagements the ford was the scene of many stirring events.

E. A. CARMAN

Kelp, any of several large broad-leaved fucoid seaweeds (q.v.), which are burned for making ash and used for other purposes. The ash is known as "kelp" (or in France as *varec*), and was formerly produced in large quantities by slowly charring several tons of the weed in a shallow pit. The yield in ash was about 5 per cent of the weight of the mass burned. This crude ash contains several salts, especially carbonates and sulphates of sodium and potassium, with other substances in smaller proportions. It used to be the principal source of soda and iodine, but these substances are now otherwise obtained, and the making of kelp-ash has ceased to be profitable.

Kelp-crab, a large squarish edible crab (*Epialtus productus*), numerous in rocky weed-covered places along the Pacific coast from Monterey to Puget Sound.

Kelp-fish, a large blenny (*Heterostichus rostratus*) of the Californian coast, which is sold for food in the local markets. It is reddish brown, much streaked and mottled, so that it is practically invisible among the sea-weeds (kelp) where it usually lurks. Many other more or less similar fishes are called kelp-fishes in other parts of the world.

Kel'tie, John Scott, Scottish geographer: b. Dundee, Scotland, 29 March 1840. He has

been editor of the 'Statesman's Year Book' from 1880, is editor of the 'Geographical Journal,' and has written extensively on geographical and scientific topics in newspapers and periodicals. He has published 'History of Scottish Highlands and Clans' (1874); 'Report on Geographical Education' (1886); 'Applied Geography' (1890); 'The Partition of Africa' (1894). He is a member of geographical societies all over the world.

Kel'ton, John Cunningham, American soldier: b. Delaware County, Pa., 1828. He was graduated at West Point in 1851, received the commission of lieutenant in the infantry and served for six years in the frontier garrisons of Minnesota, Kansas, and Dakota. At the conclusion of that period he was ordered to West Point as instructor in the use of small arms. During the Civil War he returned to active service and in 1861 became purchasing agent for the Western Department. The same year he was put in command of the 9th Missouri volunteers, with the commission of colonel. In 1862 he was appointed to the staff of Major-General Halleck, as assistant adjutant-general, and in 1865 brevetted brigadier-general in the regular army. He was appointed after the war a staff colonel and assistant adjutant-general at Washington; and invented improvements in military firearms which met with the acceptance of the Ordnance Department. Among his works on military subjects may be mentioned a 'Manual of the Bayonet' (1861).

Kelts. See CELTS.

Kel'vein, Lord. See THOMSON, SIR WILLIAM.

Kem'ble, Adelaide. See SARTORIS, ADELAIDE KEMBLE.

Kemble, Charles, English actor, 11th child of Roger Kemble (q.v.), and younger brother of John Philip Kemble (q.v.): b. Brecon, South Wales, 25 Nov. 1775; d. London 12 Nov. 1854. He was educated at the English Roman Catholic College at Douay, France, and in 1794 made his first appearance at Drury Lane as Malcolm to his brother's Macbeth. In 1800 he produced at the Haymarket Theatre his adaptation of Mercier's 'Deserteur,' under the title of 'The Point of Honor,' which achieved considerable success. In 1807 his play of 'The Wanderer,' adapted from Kotzebue, and in 1808 his farce of 'Plot and Counterplot' were both successfully brought on the stage. As an actor he gained special celebrity by the performance of such characters as Falconbridge, Edgar, Romeo, Charles Surface, Cassio, Don Felix, and Benedick. His impersonations were greatly heightened by the physical advantages which he possessed of a fine voice, handsome features, and a tall athletic figure. About 1840 he was appointed to the office of examiner of plays, and shortly afterward made his last appearance on the stage. He subsequently gave occasionally public readings from Shakespeare. He was the father of John Mitchell Kemble (q.v.), the philologist, and of Fanny and Adelaide Kemble (q.v.). Consult Fitzgerald, 'The Kembles' (1871).

Kemble, Elizabeth. See WHITLOCK, ELIZABETH KEMBLE.

KEMBLE — KEMEYS

Kemble, Frances Anne, English actress and author, daughter of Charles Kemble (q.v.): b. London 27 Nov. 1809; d. there 16 Jan. 1893. She manifested no special predilection for the stage, but made her début at Covent Garden, then under the management of her father, in October 1829. On this occasion she played Juliet, her father taking the part of Romeo, and her mother that of the nurse, with complete success. For the three succeeding years she performed leading parts in tragedy and comedy with great applause, distinguishing herself particularly in *Juliet*, *Portia*, *Bianca* in Milman's *'Fazio'*, *Julia* in the *'Hunchback'* (the latter being originally personated by her), *Belvidera*, *Isabella*, *Lady Teazle*, and *Louise de Savoy*, in her own play of *'Francis the First'*, written when she was 17, and received with approbation. In 1832 she accompanied her father to the United States, and met with an enthusiastic reception in the chief cities. In 1834 she was married to Pierce Butler, a Georgia planter, and retired from the stage. The union proving unhappy, a separation took place at the end of a few years, and Mrs. Butler fixed her residence in Lenox, Mass. In 1849 she secured a divorce and resumed the name of Kemble. Her first work in prose, *'A Journal of a Residence in America'* (1835) was chiefly devoted to a description of her tour through the United States. It was followed in 1837 by a drama, *'The Star of Seville'*, acted with success; and in 1844 appeared a collection of her poems. Later works were *'A Year of Consolation'* (1847); *'Residence on a Georgia Plantation'* (1863); *'Record of a Girlhood'* (1878-9); *'Records of Later Life'* (1882); *'Notes upon Some of Shakespeare's Plays'* (1882); *'Poems'* (1883); *'Far Away and Long Ago,'* a story (1889); *'Further Records'* (1891). In the winter of 1848-9 she commenced in Boston a series of Shakespearian readings which drew crowded audiences, and during the next two years repeated the course in some of the principal American cities. In 1851 she returned to England, reappeared for a brief period on the stage, and gave readings in London and other parts of the United Kingdom. In 1856 she returned to the United States, and continued for several years at intervals to give readings in Boston and elsewhere. Her grandson, Owen Wister (q.v.) is a well known American writer.

Kemble, George Stephen, English actor: b. Kington, Herefordshire, 3 May 1758; d. 5 June 1822. He was a son of Roger Kemble (q.v.) and in 1783 made his début in London at Covent Garden Theatre as Othello. In the latter part of his career his increasing bulk enabled him to play the part of Falstaff without resort to padding. He was at various times theatrical manager in London, Edinburgh, and Glasgow.

Kemble, John Mitchell, English Anglo-Saxon scholar: b. London 2 April 1807; d. Dublin 26 March 1857. He was educated at Trinity College, Cambridge, and having early directed his attention to Anglo-Saxon language and history, employed himself in the ancient MSS. in the libraries of the university. The first fruits of his researches appeared in 1833, in the publication of the Anglo-Saxon poem *'Beowulf'*, in 1834, and issued a pamphlet on the *'History of the English Language, First or Anglo-Saxon Period.'* He edited in seven octavo volumes,

for the English Historical Society, a collection of all the known charters of the Anglo-Saxon period, under the title of *'Codex Diplomaticus Ävi Saxonici'*, and in 1849 appeared his most valuable and best known work, *'The Saxons in England.'* Kemble was for many years editor of the *'British and Foreign Review'*, and in 1840 succeeded his father, Charles Kemble (q.v.), as censor of plays, which office he occupied till his death.

Kemble, John Philip, English tragedian, eldest son of Roger Kemble (q.v.): b. Prescott, Lancashire, 1 Feb. 1757; d. Lausanne, Switzerland, 26 Feb. 1823. He was educated at the Roman Catholic seminary of Sedgley Park, Staffordshire, and the College of Douay, France, where he early distinguished himself by his proficiency in elocution. On his return to England he entered immediately upon the profession of an actor, and appeared for the first time in London at Drury Lane, 30 Sept. 1783, in the part of Hamlet, and was received with great applause. It was not, however, till 1788 that he took a decided lead in tragedy. He afterward obtained the management of Drury Lane Theatre, where his sister, Mrs. Siddons (q.v.), was the leading actress. In 1794 he brought out a musical entertainment of his own, entitled *'Lodiska'*, which had a great run. In 1802 he became manager of the Covent Garden Theatre, where he continued his career with great success till the destruction of the theatre by fire in 1808. In the autumn of 1809 the new edifice which had been constructed opened with an increase of prices, which, with certain obnoxious arrangements in regard to the private boxes, created for a series of nights the disturbances known by the name of the O. P. riots. Kemble retired from the stage 23 June 1817. As an actor he was distinguished for dignity, precision, and studious preparation. His merits were differently appreciated, but by all he was regarded as a highly gifted actor, and the impressions made in characters more immediately adapted to his style of excellence, such as Cato, Coriolanus, Hamlet, John, Jaques, Penruddock, was very great. See Boaden, *'Memoirs of the Life of John Philip Kemble'* (1825).

Kemble, Roger, English actor and theatrical manager: b. Hereford 1 March 1721; d. 6 Dec. 1802. John Philip Kemble (q.v.) and Mrs. Siddons (q.v.) were his children. He organized in 1753 a traveling company in which many members of his family appeared. In 1788 he appeared at the Haymarket as Falstaff and the Miller in *'The Miller of Mansfield'*, when, although rated as a mediocre actor, he is said to have played "with very superior effect."

Kemeys, Edward, American sculptor: b. Savannah, Ga., 31 Jan. 1843. He was educated in New York and served in the Civil War as captain in the artillery. He resigned in 1866 and went west, where he saw something of Indian life, and became familiar with the habits and forms of big game. He returned to New York and worked as a civil engineer in the laying out of Central Park, but did not seriously choose the profession of art until 1870, when he resolved to become a sculptor. He went abroad in 1877 and his exhibits in Paris and London attracted attention, especially his *'Fight between a Buffalo and Wolves'* in the Salon of 1878. He has made American wild animals his spe-

KEMNITZ — KEN

cialty. He is in short the American Barye; his 'Panther and Deer,' his 'Coyote and Raven,' are noteworthy for their fidelity to nature and life-like expression, and he is also remarkably successful in his figures of the North American Indian.

Kem'nitz, Martin. See CHEMNITZ, MARTIN.

Kempe, Charles Eamer, English worker in stained glass: b. Ovingdeane, Sussex, 29 June 1837. He received his early education at Rugby, and was graduated at Oxford University. His principal works have been in stained glass of the 13th century style in which the color, drawing and expression are of a unique excellence. He is distinctly a religious painter, who choosing as his medium the most difficult and intractable of methods and materials, has achieved supreme artistic and devotional success. His principal production in this country is the remarkable Jesse window in the Church of the Advent, Boston, which bears comparison with the more famous Jesse window of Troyes, France. He has designed and executed many fine windows for the cathedrals of Lichfield and Durham, and the 'Jane Austen' window recently set up in Winchester Cathedral is one of his latest creations.

Kem'per, James Lawson, American soldier and politician: b. Madison County, Va., 11 June 1823; d. Orange County, Va., 7 April 1895. Graduated from Washington College (Lexington, Va.) in 1842, he studied law at Charles-town (Va.), served in the Mexican War as captain of volunteers, and for ten years was a representative in the Virginia legislature, during two of which he was speaker of the house. In 1861 he was appointed colonel of the 7th Virginia, C. S. A.; in 1862 fought at Fair Oaks (31 May—1 June), where he was commissioned brigadier-general; and later also at Frayser's Farm (30 June), South Mountain (14 September), Antietam (16–17 September); and Fredericksburg (13 December). He was severely wounded at Gettysburg, was subsequently detailed to command the forces in and about Richmond, and 1 March 1864 was promoted major-general. After the war he practised law in Madison County, was Democratic governor of the State in 1874–8 and at the close of his term became a planter in Orange County. He published a collection of messages to the State legislature (1876).

Kemper, Reuben, American soldier: b. Fauquier County, Va., 1770; d. Natchez, Miss., 10 Oct. 1826. He emigrated to Ohio in 1800, and subsequently removed with two of his brothers to the Territory of Mississippi, where they were leaders in the movement to rid West Florida of Spanish rule. The Spanish authorities caused the Kempers to be kidnapped, but they were rescued by the commander of the American fort at Point Coupee. The Kempers pursued with great ferocity all who were engaged in this wrong upon them, and Reuben devoted himself to the task of driving the Spaniards from the American continent. He was engaged in an attempt to capture Mobile, which failed; and on the fitting out of the formidable expedition of Gutierrez and Toledo, in 1812, against the Spanish authority in Mexico, was assigned the rank of major, and afterward chosen colonel of the force, which co-operated

with the Mexican insurgents. The expedition advanced into Texas, fought several bloody battles, in which Kemper and his Americans performed extraordinary feats of valor, and won brilliant victories. Kemper was subsequently engaged under General Jackson in the defense of New Orleans, and added greatly to his reputation as a soldier by his activity and efficiency. At the conclusion of the war he became a planter in Mississippi.

Kempff, Louis, American rear-admiral: b. Belleville, Ill., 11 Oct. 1841. He was graduated at the United States Naval Academy in 1861 and served with distinction throughout the Civil War. He was promoted captain in 1891, and became rear-admiral in 1899. When the Boxer troubles began in China in 1900 he was placed in command of the United States naval forces in Chinese waters. On 29 May he sent 108 marines ashore, who co-operated with the men landed from the other foreign warships in the harbor at Taku. When the Chinese forts were shortly after bombarded by the allied naval forces he declined to participate in the attack, on the ground that his government was not at war with China. For the judgment displayed on that occasion a joint resolution was pending in the 57th Congress conferring on him the thanks of Congress. He was retired from active service in October 1903.

Kem'pis, Thomas à, German devotional writer: b. Kempen, near Cologne, 1380; d. Mount Saint Agnes, near Zwolle, Netherlands, 26 July 1417. He was educated at Deventer by the Brethren of the Common Life, a religious order of men who passed a contemplative existence in transcribing manuscripts, compiling and writing religious books of various sorts, and religious exercises. In 1399 he entered the monastery of Mount St. Agnes, near Zwolle, of which his brother was prior, took the monastic vows in 1406, was ordained priest six years afterward, and in 1425 was elected sub-prior. He excelled as a copyist, and delighted to transcribe the Scriptures, the church fathers, and works of ascetic piety, while the fame of his eloquence and zeal was widely extended. He owes his present renown to his treatise 'De Imitatione Christi,' which has been translated into every language in Christendom. It has been wrongly but somewhat naturally attributed to the renowned theologian Gerson, chancellor of the University of Paris, and the question was debated with a view to national honor and the interests of ecclesiastical orders. The evidence in favor of the authorship of à Kempis is overwhelming. Three writers nearly his contemporaries mention him as author. Moreover several copies written in his own hand are extant, and in one ancient copy he is expressly named as the author. Both the literary style and the tone of refined piety which characterize this work are also distinguishing features of the devotional works of which he is certainly the author. Consult Kettlewell, 'Thomas à Kempis and the Brothers of the Common Life' (1884); Wolfsgruber, 'Giovanni Gerson, sein Leben und sein Werk De Imitatione Christi' (1880).

Ken, or Kenn, Thomas, English bishop and hymnologist: b. Little Berkhamstead, Hertfordshire, 1 July 1637; d. Longleat, Wiltshire, 19 March 1711. He was educated at Winchester School, graduated from New College, Oxford,

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and became successively domestic chaplain to Bishop Morley (1665); rector of Brightstone, Isle of Wight (1667); and prebend of Winchester (1669). He spent five years traveling on the continent with his nephew Izaak Walton, living principally at Rome (1675–80), and accompanied Mary, Princess of Orange, to Holland, as domestic chaplain. In 1680 he was appointed chaplain to Charles II., attended him in his last illness, and was nominated by him to the bishopric of Bath and Wells (1684). He suffered deprivation with other non-jurors (q.v.) on the accession of William of Orange, for maintaining allegiance to James II. (1691). He was one of the lights of the English Church in one of the darkest periods of English social life, and by his zeal and devotion did much to maintain the standard of Christian conduct, his personal example of goodness being backed by learning, taste, and breadth of sympathy. His theological and devotional writings are principally valuable for the personality with which they are connected, but his immortal 'Morning and Evening Hymns' have won for him imperishable fame as the guide and inspirer of Christian devotion. Consult: Plumptre, 'Life of Bishop Ken' (1888).

Kenai, kē-nī', a peninsula in the southern part of Alaska, with William Sound on the east, Gulf of Alaska east and south, and Cook Inlet on the west. It is about 160 miles long and 110 miles across the widest part. It has good harbors, valuable coal fields, and some gold has been discovered.

Ken'dal, Margaret Brunton Robertson (GRIMSTON), English actress: b. Great Grimbsy 15 March 1849. She was a sister of T. W. Robertson, the dramatist (q.v.); was known on the stage as "MADGE ROBERTSON" and made her first appearance in London, as Ophelia, in 1865. She soon gained a reputation as an excellent actress of high comedy. On her marriage to W. H. Grimston (q.v.) in 1869 she assumed with him the stage name of Kendal. The Kendals made several visits to America after 1889 and secured favorable notice wherever they were seen.

Kendal, William Hunter (WILLIAM HUNTER GRIMSTON), English actor: b. London 16 Dec. 1843. After his marriage to Madge Robertson (see KENDAL, M. B. R.) in 1869, he played leading parts with her. He commenced his career on the stage at Glasgow in 1862, where he remained till 1866, supporting such stars as Mr. and Mrs. Charles Kean, Helen Faucit, G. O. Brooks, etc.; made his first appearance in London at the Haymarket Theatre in 1866, in 'A Dangerous Friend,' played there such parts as Charles Surface, Captain Absolute, Romeo, Orlando, Pygmalion, and in 1879–88 was lessor and manager with John Hare of the St. James Theatre, where were produced 'The Queen's Shilling'; 'The Squire'; 'Impulse'; 'The Ironmaster'; 'A Scrap of Paper'; 'Lady of Lyons'; and 'As You Like It.' He toured with Mrs. Kendal in the United States and Canada in 1889–95.

Ken'dall, Amos, American journalist and statesman: b. Dunstable, Mass., 16 Aug. 1789; d. Washington, D. C., 11 Nov. 1869. He was graduated from Dartmouth in 1811, studied law at Groton, Mass., in 1811–14, was admitted to the bar at Frankfort, Ky., in 1814, was post-

master and editor of the 'Patriot' at Georgetown, Ky., in 1815–6, and in 1816–29 co-editor and part owner of the 'Argus of Western America' at Frankfort. In 1829 he was appointed fourth auditor of the United States treasury, and during the Jackson administration he was extremely influential. He aided in the formation of the President's anti-bank policy (see JACKSON, ANDREW), was a special treasury agent to conduct negotiations with State banks, and is thought to have written several of Jackson's state papers. Appointed postmaster-general by Jackson in 1835, he was retained by Van Buren, but in 1840 resigned because of ill health. He cleared the post-office department of debt, and introduced numerous reforms. He established 'Kendall's Expositor,' bi-weekly, in 1841, and the 'Union Democrat,' weekly, in 1842, but both journals shortly ceased publication. In 1845 he became associated with S. F. B. Morse (q.v.) in the ownership and management of the Morse electric telegraph patents, and by his able direction ensured their commercial success and a fortune for himself. He gave largely in Washington for philanthropic purposes. Though calling himself a Jackson Democrat, he strongly opposed secession. He wrote an incomplete 'Life of Andrew Jackson, Private, Military, and Civil' (1843); 'Full Exposure of Dr. C. T. Jackson's Pretensions to the Invention of the Electromagnetic Telegraph' (1867), and an 'Autobiography,' posthumously published (1872).

Kendall, George Wilkins, American journalist: b. Amherst (now Mount Vernon), N. H., 1809; d. Oak Springs, Texas, 22 Oct. 1867. Settling in New Orleans in 1835, he was one of the founders of the New Orleans *Picayune* in 1837, which became under his direction one of the leading journals of the South. He wrote 'Narrative of the Texas Santa Fe Expedition' (1844), an expedition in which he took part; and 'The War Between the United States and Mexico' (1851).

Kendall, Henry Clarence, Australian poet: b. Ulladalla district, New South Wales, 18 April 1841; d. Redfern, near Sydney, 1 Aug. 1882. He became a lawyer's clerk at Sydney in 1860, in 1863 a clerk in the lands department of the New South Wales public service; later was in the colonial secretary's office; in 1869–73 was active as a journalist at Melbourne; and for some time previous to his death was an inspector of forests. His chief volumes are: 'Leaves from an Australian Forest' (1869), and 'Songs from the Mountains' (1880). He has been called the "poet of the bush" because of his skilful delineation of the character of Australian landscape. In 1886 appeared a collected edition of his verse, with a memoir.

Kendall, William Sergeant, American painter: b. Spuyten Duyvil, N. Y., 20 Jan. 1869. He began as a member of the Art Students' League of New York, and subsequently was a pupil of Thomas Eakins of Philadelphia. He went to France and attended the Ecole des Beaux Arts, and also studied under Olivier Messon. He is equally successful in figure, portrait, and landscape, and has received several honors in acknowledgment of his merit as a fine colorist and powerful draftsman. One of his best pictures is 'The End of the Day,' in which tender sentiment is united with workmanship of excellence.

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Ken'drick, Asahel Clark, American Baptist clergyman and scholar: b. Poultney, Vt., 7 Dec. 1809; d. Rochester, N. Y., 21 Oct. 1885. He was graduated from Hamilton College, Clinton, N. Y., in 1831, and was professor of Greek at Madison (now Colgate) University, Hamilton, N. Y., 1831–50; and held a similar post in the University of Rochester from 1850. Besides translations and several text-books, and revising and editing Olshausen's 'Old Testament Commentary' and Meyer's 'Commentary on John,' he published 'Our Poetical Favorites' (1880); 'The Moral Conflict of Humanity' (1894); etc. He was one of the American committee of New Testament revisers.

Kendrick, John, American navigator: b. Boston about 1745; d. Hawaii 1800. During the Revolution he sailed a privateer, and in 1787, while in command of the Columbia and the Washington, explored the northwestern coast of America and various Pacific islands. In 1791 he voyaged to the South Seas, and established the Chinese trade in sandalwood, which for a long time he successfully carried on. He was among the earliest American sailors to attempt voyages for discovery.

Kendrick, John Mills, American Protestant Episcopal bishop: b. Gambier, Ohio. He was educated in the university of his native town, and was ordained deacon 1864, and priest in the following year. After several years' experience as rector and missionary, in 1889 he was consecrated bishop of Arizona, a post he still occupies, with Phoenix, Arizona, as his see city.

Kenealy, kē-nēlē, Arabella, English novelist: b. Sussex. She is a daughter of Dr. Kenealy, the famous advocate of the Tichborne "Claimant," and after pursuing medical studies practised as a physician in London and at Watford 1886–94. She has published 'Dr. Janet of Harley Street' (1893); 'Such Men Are Such Gentlemen' (1894); 'Woman and the Shadow' (1898); 'A Semi-Detached Marriage' (1899); 'Charming Renée' (1900); etc.

Kenesaw (kēn-ē-sā') Mountain, a mountain in Georgia 25 miles northwest of Atlanta. It is famous as the scene of a battle in the Civil War between the Union troops under Sherman, and the Confederates under Johnston.

Kenesaw Mountain, Battle of. On the night of 18 June 1864 Gen. J. E. Johnston fell back before Gen. Sherman's persistent advance and took a new line with Kenesaw Mountain as its salient, his right wing thrown back so as to cover Marietta, and his left covering the railroad back to the Chattahoochee. Sherman worked to the right, threatening the railroad, and was attacked by Hood's corps at Kolb's Farm (q.v.), 22 June. After much study of the ground, Sherman concluded that he had no alternative but to assault Johnston's line or turn his position. Either course had its difficulties and dangers, but as the enemy and his own officers had settled down to the conviction that he would not assault fortified lines, but would execute flanking movements only, he considered that a successful assault would have a good moral effect and show that he could move against an enemy behind breastworks; so he resolved to attack the left centre of Johnston's position, and orders were given on the 24th that on the 27th McPherson should assault near Little

Kenesaw and that Thomas should assault about a mile further south. Kenesaw was strongly entrenched and held by Loring's and Hardee's corps, Loring on the right, opposite McPherson, Hardee on the left, opposite Thomas. About 9 A.M. of the 27th the troops moved to the assault, and all along the lines for ten miles a furious fire of artillery and musketry was kept up. A part of Logan's Fifteenth corps, formed in two lines, fought its way up the slope of Little Kenesaw, carried the Confederate skirmish-pits, and tried to go further, but was checked by the rough nature of the ground and the fire of artillery and musketry delivered at short range from behind breastworks. Logan's assault failed, with a loss of 600 men, and his troops were withdrawn to the captured skirmish-pits. About a mile to the right Thomas assaulted with Newton's and Davis' divisions. The troops charged up the face of the mountain, drove in the skirmish-line, and reached the main works, but were unable to carry them under the heavy fire of canister and musketry at short range; after heroic effort and the loss of Gens. C. G. Harker and Daniel McCook, commanding brigades, and 1,580 killed, wounded, and missing, fell back and intrenched 75 yards from the enemy's works. The assault was over by 11.30 A.M., and was a failure. It was the most serious reverse sustained by Sherman in the campaign. The entire Union loss was nearly 2,500; Johnston admits a Confederate loss of 808 killed and wounded. Consult: 'Official Records,' Vol. XXXVIII.; Cox, 'Atlanta'; Van Horne, 'History of the Army of the Cumberland,' Vol. II.; Sherman, 'Personal Memoirs,' Vol. II.; Johnston, 'Narrative'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

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Kenia, kā'ne-ä, Mount, an isolated extinct volcano situated in British East Africa, a few miles south of the equator. Its summit is covered with perpetual snow, and for this reason it is known as Doenyo Ebor or White Mountain. Its height is from 18,000 to 19,000 feet. It was discovered by Krapf in 1849, and its summit was first reached (by Kolb) in 1895.

Kenilworth, kēn'l-wērth, a novel by Sir Walter Scott, published in 1819, when its author had long been distinguished both as poet and novelist. It was the second of his great romances drawn from English history; the central figure is that of Queen Elizabeth, surrounded by the brilliant and famous characters of the period—Burleigh, Edmund Spenser, Sir Walter Raleigh; and also by a host of petty sycophants.

Ken'ly, John Reese, American soldier: b. Baltimore 1822. He served in the American army during the Mexican War, attaining the rank of major, and during the Civil War commanded the 1st Maryland regiment, which was captured by Stonewall Jackson at the battle of Front Royal, 23 May 1862. He subsequently commanded a brigade and was brevetted major-general of volunteers at the close of the War. His experiences during the Mexican War are recounted in his 'Memoirs of a Maryland Volunteer' (1873).

Ken'nan, George, American traveler, author, and lecturer: b. Norwalk, Ohio, 16 Feb. 1845. He received a secondary education, became a telegraph operator, in 1865 went to north-

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eastern Siberia as an explorer and telegraph engineer, and in 1866-8 superintended the construction of the middle division of the Russo-American telegraph line. In 1870-1 he explored the mountain region of eastern Caucasus and Daghestan, upon his return to America was active as lecturer and journalist, and in 1877-85 was night manager of the Associated Press at Washington, D. C. In 1885-6, with G. A. Frost, an artist, he accomplished a journey of 15,000 miles through Russia and Siberia in investigation of the Russian exile system. He visited all the mines and prisons between the Ural Mountains and the headwaters of the Amur, and published an account of his observations in 'Siberia and the Exile System' (1891), first printed in the 'Century Magazine' (1889-90). From 1886 he lectured in Great Britain and the United States on his Siberian experiences. In 1898, during the Spanish-American war, he visited Cuba with the Red Cross Society and as special commissioner of the 'Outlook' of New York, to which he contributed valuable articles. In 1902 in company with American scientists he explored Mt. Pelée, Martinique, and the scene of the St. Pierre disaster. He further published in book form: 'Tent Life in Siberia' (1870), and 'Campaigning in Cuba' (1890).

Kennebec (kĕn-e-bĕk') **River**, a river in Maine, next to the Penobscot the most important in the State. Its principal source is Moosehead Lake, on the boundary line between Somerset and Piscataquia counties. After a course of 20 miles it receives Dead River from the right. It enters the Atlantic in Sagadahoc County through Sheepscott Bay, an irregular indentation of the coast studded with many islands. The largest tributary of the Kennebec is the Androscoggin, which joins it 18 miles from the ocean at Merrymeeting Bay. The outlets of a number of small ponds, and Sebasticook and Sandy rivers, also flow into it. The most important towns on its banks are Bath, Richmond, Gardiner, Hallowell, Augusta, and Waterville. It has falls at Waterville and at three points above, which afford excellent motive power. Its whole length is about 150 miles, in which it has a descent of 1,000 feet. The influence of the tide extends to Augusta, 42 miles from the sea. A dam with locks was constructed at Augusta for the purpose of improving the navigation above that point, and increasing the water power. The structure is 584 feet long and 15 feet above ordinary high water mark, and cost \$300,000. It forms a pond 16½ miles in extent, with an average depth of 16 feet. The river is closed by ice at Hallowell from the middle of December to about 1 April; below Bath it is open at all seasons except during winters of unusual severity.

Kennebunk, kĕn-e-bĕnk', Maine, town in York County, on the Kennebunk and Mousam rivers and the Boston & Maine railroad, 24 miles southwest of Portland. The ample water-power here is utilized for various manufacturing industries, among the articles produced being leatheroid, sample-cases, shoe-stiffenings, fibre-board, and lumber. The town has a free circulating library containing several thousand volumes. It is one of the old towns of Maine, its settlement dating from about 1650. Until 1820, the year in which Maine became a separate State, Kennebunk was a part of Wells. Pop. (1890), 3,172; (1900), 3,228.

Kennebunkport', Maine, town in York County, 25 miles southwest of Portland, on the Atlantic Ocean, at the mouth of the Kennebunk River, and on the Boston & Maine railroad. It is situated on a good harbor, has an excellent beach, fine boating facilities on the river, and is a favorite summer resort with superior hotel and boarding-house accommodations. Besides Talbot's Library, the town has public and circulating libraries. Its industries include the manufacture of lumber and the building of boats and canoes. The town was settled in 1629, and incorporated as Cape Porpoise in 1653. Having been nearly destroyed by Indians in 1703, it was reincorporated in 1717 as Arundel, and in 1821 took its present name. Pop. (1890), 2,196; (1900), 2,123.

Ken'ney, John Pendleton, American novelist: b. Baltimore, Md., 25 Oct. 1793; d. Newport, R. I., 18 Aug. 1870. He was graduated at Baltimore College in 1812, and in 1814 served as a volunteer in the ranks, taking part in the battles of Bladensburg and North Point. In 1816 he was admitted to the practice of the law, which he followed successfully for 20 years. In 1818 he commenced authorship, by the publication, in connection with his friend Peter Hoffman Cruse, of the 'Red Book,' a serial of light character in prose and verse issued about once a fortnight, and continuing two years. In 1820 he was elected to the Maryland house of delegates, and re-chosen the two next years. In 1832 he published his first novel, 'Swallow Barn, or a Sojourn in the Old Dominion,' descriptive of the plantation life of Virginia. In 1835 appeared 'Horseshoe Robinson, a Tale of the Tory Ascendancy,' the most successful of his writings. In 1838 he published 'Rob of the Bowl, a Legend of St. Inigoes,' relating to the Maryland province in the days of Cecilius Calvert, second Lord Baltimore. Kennedy was a member of Congress 1839-45, and was prominent among the Whig members. In 1849 appeared his 'Life of William Wirt, Attorney-General of the United States,' and in 1852 he became secretary of the navy. His works not previously named include: 'Annals of Quodlibet' (1840); 'Mr. Ambrose's Letters on the Rebellion' (1865). He was a friend of Thackeray, and wrote or sketched in outline the fourth chapter of the second volume of 'The Virginians.' Consult 'Life' by Tuckerman.

Ken'net River, a tributary of the Thames, in England. It rises in Wiltshire, flowing east through Berkshire, emptying into the Thames at Reading, after a course of 46 miles. It is a part of the waterway connecting the North Sea with Saint George's Channel.

Kenney, kĕn'i, Richard Rolland, American politician: b. Little Creek Hundred, Sussex County, Del., 9 Sept. 1856. He was graduated at State librarian, 1879-83. In January 1887, was admitted to the Delaware bar in 1881, and was State librarian, 1879-83. In January, 1887, he was elected to the United States Senate as a Democrat and became a popular leader. His term expired in March 1901, and a deadlock occurring in the Delaware legislature, which was Republican, a successor to Kenney was not elected and Delaware is now (1903) unrepresented in the National Senate.

KENNY — KENT

Ken'ny, Sir Edward, Canadian statesman: b. County Kerry, Ireland, 1800; d. Halifax, N. S., 16 May 1891. He removed to Halifax in 1824, where he engaged in business, and was mayor at one time. He was member for 26 years of the legislative council of Nova Scotia, during 11 of which he was president; served as receiver-general of Canada 1869-79; president of the privy council 1869-70; and senator 1867-70; being knighted in the year last named.

Kenosha, kē-nō'shā, Wis., city, county-seat of Kenosha County; on Lake Michigan, and on the Chicago & N. railroad; about 35 miles south of Milwaukee. It has steamer communication with many of the ports on the Great Lakes. It is a trade centre for quite an extent of country. Its chief manufactures are leather, typewriters, furniture, wagons, lamps, machinery, iron bedsteads, and flour. It is the seat of Kemper Hall School (P. E.). The Simmons Memorial Library contains about 6,000 volumes. The city owns and operates the water-works; the water is obtained from the lake and artesian wells. Pop. (1890) 6,532; (1900), 11,666.

Ken'rick, Francis Patrick, American Roman Catholic bishop: b. Dublin, Ireland, 3 Dec. 1797; d. Baltimore 6 July 1863. After studying in Rome 1815-21, he was ordained priest in the latter year and sent to this country to take charge of a seminary at Bardstown, Ky. He remained at Bardstown nine years till his appointment as coadjutor bishop of Philadelphia in 1830. Twelve years later he became bishop of Philadelphia and there founded the seminary of St. Charles Borromeo. In 1851 he was installed archbishop of Baltimore and the next year presided over the first plenary council of American Roman Catholic prelates. He became honorary primate of the United States in 1859. He was prominent as a controversialist and a Biblical scholar, and published 'Dogmatic Theology' (1839-40); 'Moral Theology' (1841-3); a revision of the Douai English Bible, with notes, etc.

Kenrick, Peter Richard, American Roman Catholic archbishop: b. Dublin, Ireland, 17 Aug. 1806; d. St. Louis, Mo., 4 March 1896. After studying at Maynooth he was ordained priest in 1830, and came to the United States in 1833. He was professor of dogmatics in the seminary of the diocese of Philadelphia and subsequently became vicar-general. In 1841 he was appointed coadjutor to Bishop Rosati, of St. Louis, succeeded to that bishopric in 1843, and was created first archbishop of St. Louis in 1847. He opposed the dogma of papal infallibility but acquiesced in its final decree. He published 'The Holy House of Loretto'; 'Anglican Ordinations'; 'Vaticana'; etc. He was a brother of F. P. Kenrick (q.v.).

Kenrick, William, English miscellaneous writer: b. about 1725; d. London 10 June 1779. He believed himself a genius, and was for years active as a libeler of successful authors and actors. Among those whom he attacked were Goldsmith, Garrick, Johnson, Colman, and Fielding. He lectured, too, on subjects ranging "from Shakespeare to the perpetual motion, which he thought he had discovered."

Kenrick, William, American nurseryman: b. 1795; d. 1872. He was the son of a nursery-

man, whose gardens occupied the locality where John Eliot first preached to the Indians, and at 28 he became a partner with his father. He is remembered as having introduced into America the culture of the mulberry tree in order to establish a native silk industry, his book, 'The American Silk Growers' Guide,' in reality a work on mulberry culture, being issued in 1835. Among other novelties he introduced into America was the Lombardy poplar.

Ken'sett, John Frederick, American painter: b. Cheshire, Conn., 22 March 1818; d. New York 14 Dec. 1872. His uncle, Alfred Daggett, an engraver, gave him his first lessons in art, but in 1840 he went abroad and for seven years traveled in England, Switzerland and Italy. The fruit of this student-ramble was a large number of sketches and paintings, out of which he exhibited in 1845 in the Royal Academy. On returning to America he lived chiefly in New York and in 1849 was elected a National academician. His landscapes are more remarkable for sweetness than for strength, but he maintains a uniform standard of merit in all of them. His technique is delicate and refined, especially in his small canvases. He delights in the scenery of the Hudson, and of the sea-coast, and some of his effects are exquisitely charming. Among his landscapes the most interesting are 'Sunset on the Coast' (1858); 'October Afternoon' (1864); 'Noon on the Sea-Shore,' which has been engraved by Hunt. Several of his pictures are in the Metropolitan Museum of Art, New York, the finest of them being 'White Mountains,' a masterpiece of its class. He was for some years a member of the national art commission appointed to direct the decoration of the National Capitol.

Kensington Gardens, a celebrated public park in London four miles west of Saint Paul's, and well known for its royal palace. In former times Kensington Palace was a favorite royal residence; and King William III., Queen Mary, Queen Anne, and George II. died here. Kensington Gardens and Hyde Park are much frequented in summer, and form a great ornament to the metropolis. They cover about 350 acres, and contain the Albert Memorial. In South Kensington the chief attractions are the South Kensington or Victoria and Albert Museum, the Indian Museum, the Natural History Museum, and the Imperial Institute.

Kensington Palace. See KENSINGTON GARDENS.

Kensit, John, English anti-ritualist: b. London about 1852; d. Liverpool 8 Oct. 1902. He kept a small bookshop in Paternoster Row, London, but in 1896 began an attack upon the Roman Catholic Church and the ritualistic party in the Church of England. He organized bands of preachers, called *Wycliffites*, that disturbed public worship and frequently caused riots. At the public ceremony of the confirmation of Canon Gore as bishop of Worcester (22 Jan. 1902) he objected, and then and at the subsequent consecration disturbances occurred. Since his death the movement has had no prominence.

Kent, Charles Foster, American Biblical scholar: b. Palmyra, N. Y., 13 Aug. 1867. He was graduated at the universities of Yale (1889) and Berlin (1892), and the following year became an instructor in the University of Chicago.

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In 1895 he was elected professor of Biblical literature and history at Brown University, a position which he held until 1901. He is at present Woolsey professor of Biblical literature at Yale University. Among his writings are: 'Outlines of Hebrew History' (1895); 'The Wise Men of Ancient Israel and Their Proverbs' (1895); 'History of the Hebrew People, the United Kingdom' (1896); 'History of the Hebrew People, the Divided Kingdom' (1899); 'Messages of the Earlier Prophets' (1899); 'Messages of the Later Prophets' (1900).

Kent, Jacob Ford, American general: b. Philadelphia, Pa., 14 Sept. 1835. He entered the army as 2d lieutenant 6 May 1861, became captain in January 1864; and was brevetted colonel of volunteers in October 1864, for faithful and meritorious services in the field during the campaign before Richmond. At the opening of the war with Spain he was colonel of the 24th infantry. He was made major-general of volunteers 8 July 1898, and served with distinction in Cuba, and afterward in the Philippines. He was retired in October 1898.

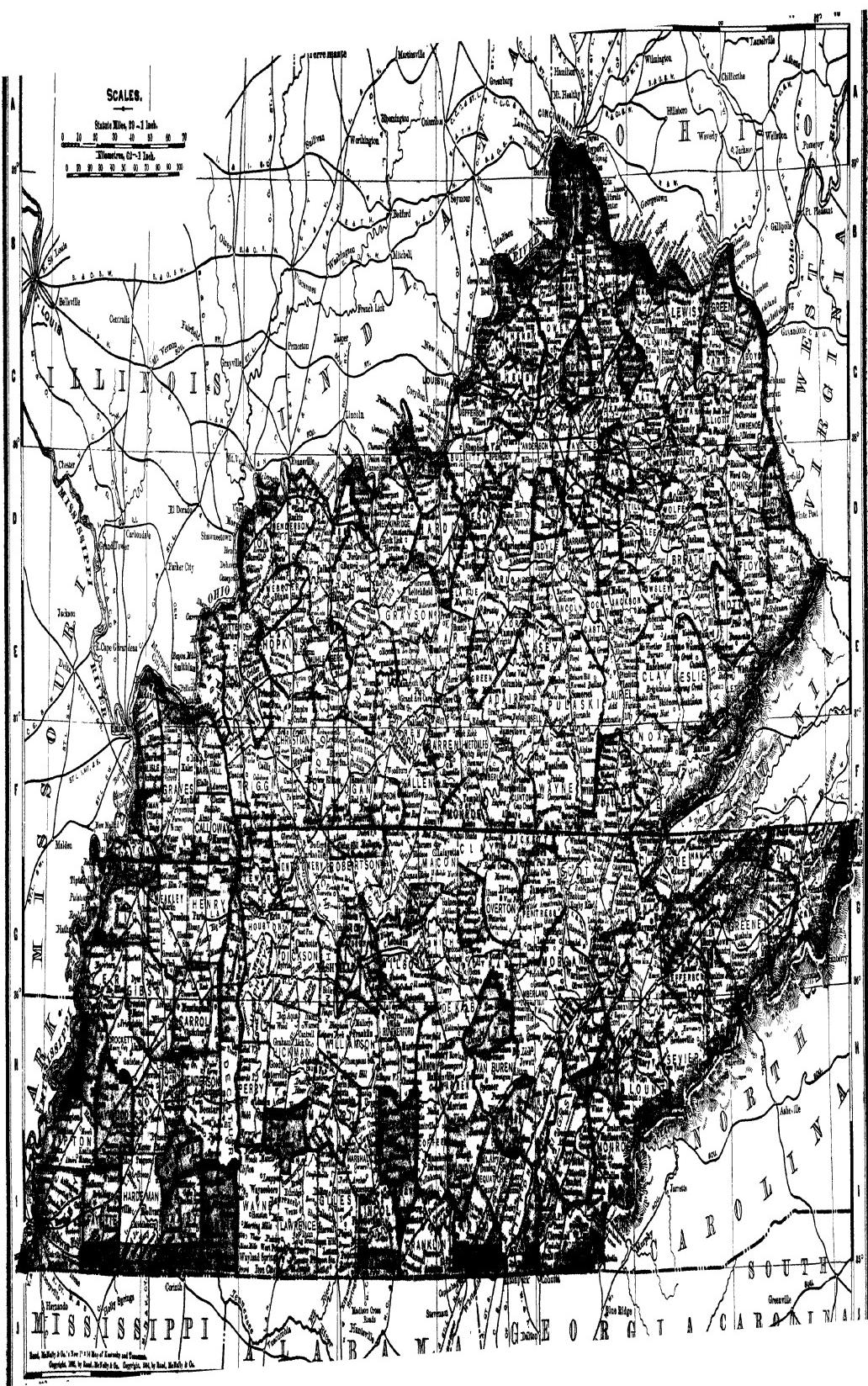
Kent, James, American jurist: b. Philippi, Putnam County, N. Y., 31 July 1763; d. New York 12 Dec. 1847. Kent was graduated at Yale College in 1781, studied law, was admitted in 1785 as an attorney, and in 1787 as a counsellor, and commenced the practice of his profession in Poughkeepsie. He soon became remarkable among his contemporaries for his legal learning and literary attainments. He was elected successively in 1790 and 1792 a member of the legislature for Dutchess County. Kent became an active and leading Federalist, attracting the notice and confidence of Hamilton and Jay. It was by Hamilton's counsel that the reading of the young lawyer was directed to the doctrines of the civil law, and the treatises of the jurists of continental Europe. In 1793 Kent removed to New York, was appointed one of the two masters in chancery for the city of New York. In 1796 he became a member of the legislature. He was also elected professor of law in Columbia College. The body of his lectures at Columbia formed in after years, in some degree, the basis of his celebrated 'Commentaries.' In 1797 he was appointed recorder of the city, and in 1798 judge of the supreme court. He continued a member of this tribunal till 1814, having been from 1804 chief justice. The supreme court at that time differed widely from the court as at present constituted. It was formed after the model of the English king's bench, being composed of five judges, who rode the circuits to try jury cases, and convened during the year at four appointed terms to decide reserved questions of law. There were no American law books, and no reports of American decisions, except those of Dallas, just commenced. The proceedings of the court were languid and dilatory; and resort was had for rules of procedure and principles of law almost exclusively to English precedents and decisions. The accession to the bench of a young, energetic, and able judge, produced a striking change. It was the task of the court to expound the principles of the common law, as applicable to American institutions; to define and limit our new constitutional provisions; to construe recent statutes; to bring the principles of commercial law to bear upon

transactions of trade and commerce; to devise rules of practice; and in short to adapt to a young and rising nation a complicated yet practical code of laws. By the constitution of New York as it then existed an important political duty was imposed on the judiciary of the State. The judges of the supreme court and the chancellor formed with the governor a council of revision with a qualified veto on legislative acts. This council was abolished in 1822. In 1814 Kent became chancellor and the seven volumes of Johnson's 'Chancery Reports,' which contain Chancellor Kent's decisions, afford a profound exposition of the system of equity law. His term of office as chancellor expired in 1823, and returning to New York he resumed his professorship at Columbia and his lectures there were given to the world, in his 'Commentaries on American Law' (1826-30). This work has since passed through 14 editions, and acquired a world-wide celebrity. It has assumed in the United States the position which Blackstone in his own country has long filled by his 'Commentaries on the Laws of England.' It embraces not merely the jurisprudence of the Federal Union, but the municipal law, written and unwritten, of the several States. Consult William Kent, 'Memoirs and Letters of Chancellor Kent' (1898).

Kent, William, English artist, architect and landscape gardener: b. Yorkshire 1684; d. London 12 April 1748. He was apprenticed to a coachmaker in 1698, went to London in 1703, and there made some attempts at painting, and to Rome, where he was a pupil of the Cavalier Luti, and whence he was brought to England by the Earl of Burlington, his patron for the rest of his life. He was employed in portrait-painting and the decoration of walls and ceilings; but Hogarth said that "neither England nor Italy ever produced a more contemptible dauber." However, he did invent a less formal method of gardening and planting, and excelled as an architect. The Horse Guards and treasury buildings, and Devonshire House, Piccadilly, are his work. He published the 'Designs of Inigo Jones' (1727).

Kent Island, the largest island in Chesapeake Bay, Md., some 15 miles long, and situated 7 miles east of Annapolis. It was here the first settlement in Maryland was made by William Claiborne (q.v.) in 1631. Pop. (1900) 2,525.

Kenton, Simon, American pioneer: b. Fauquier County, Va., 3 April 1755; d. Logan County, Ohio, in 1830. At 16 he had an affray with a young man, and believing he had killed his adversary, fled beyond the Alleghanies and became a companion of Boone and the other early pioneers of Kentucky. For a time he acted as a spy of Governor Dunmore, and subsequently participated in the warfare waged against the British and the Indians west of the Alleghanies, showing remarkable courage, sagacity, and endurance. In 1782, learning that his former opponent was living, he returned to his native place, and soon after removed with his father's family to Kentucky. He was frequently engaged in Indian warfare, until the expedition under Wayne in 1793-4 restored tranquillity to the western frontier. As the country began to fill up with settlers, his lands, to which, in consequence of his ignorance of or



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cannel. Beds of high-grade iron ore are also found in the coal fields, and elsewhere to the extent of 32 counties in all; 71,562 tons of pig iron were turned out in 1900. Building and other stones are extensively quarried: limestone products (including Kentucky River marble), as well for fertilizers and charged waters as for building, were valued at \$176,861 in 1900; sandstones, \$130,557, besides \$20,191 worth of clays. Extensive mining of fluor-spar is carried on in Crittenden and Livingston counties; valuable salt and other mineral springs are utilized; petroleum is found in the counties along the Cumberland and its affluents, formerly distilled from shales and now drilled for, its discovery in several counties in 1902 having caused considerable excitement. Its accompaniment, natural gas, is found in Meade County.

Climate and Rainfall.—The Mississippi bottom lowlands are malarious, but most of the State is mild and notably salubrious, the death rate being low and the army statistics placing Kentuckians at the very top in physical characteristics. The lowest recently recorded temperature is 8° F., and the summer heats are less than in the States to the north and west. The State is ideally watered for agriculture, the mean rainfall is about 47 inches per year, and there are no years of excessive drought.

Forests.—Over a third of the surface of the State is forested. The bottom lands are thick with densely timbered swamps; the western part is a heavily wooded region once open prairie ("the Barrens," where the Indians burnt off the undergrowth to make pasture for the wild game, and the more tenacious roots grew under the soil); and in the east along the Alleghany slopes there is a great quantity of fine timber, most of it being hardwood of astonishing variety. Oaks of many different sorts—white, red, black, post, overcup, chestnut, and black-jack,—hickory, black walnut, blue and black ash, maple, elm, beech, chestnut, poplar, sweet gum, box-elder, wild cherry, yellow pine, cypress, sycamore, and hackberry, are only a portion of its wealth, still largely virgin, though now being rapidly opened up. The poplar and black walnut which are accessible have been already largely harvested.

Soil.—The soils are locally divided into three main grades—first, second, and third rate. The first is the deep alluvium of the river bottoms, estimated at 1,000 square miles. The second (such only by comparison with the first, being one of the finest farming soils known) is the upland Blue Grass soil, covering over 10,000 square miles in 32 counties self fertilized by the decomposition of limestones and phosphatic shales so that farms a century old show no signs of exhaustion, and with decent management need no artificial fertilizer. The third are the shaly lands with insufficient drainage. Besides these there are about 1,500 square miles in swamps and barrens and some thousands where the mineral wealth is worth more than the surface would be for farming land.

Agriculture.—Though Kentucky and Tennessee are apparently artificial divisions from the same body of land, the slight difference in latitude and soils works a complete change in the characteristic products of the two. Tennessee is preeminently a cotton State, raising in 1899 234,592 bales, valued at over \$8,000,000; while Kentucky raised but 1,369 bales, in a few

counties near the Mississippi bottoms. But the immense fertility and water supply of Kentucky have made it one of our leading agricultural States; the value of its crops in 1899 was \$123,266,785, and its live stock was valued at \$73,737,106. The leading farm products are corn, tobacco, wheat and hay; and it raises nearly all the hemp produced in the United States. Vegetable and orchard fruits are grown in large quantities in the region along the Ohio, between and near the two great cities of Cincinnati (with its Kentucky suburbs Covington and Newport) and Louisville, which furnish large markets. In 1900 85.9 per cent of the land surface was in farms, and of this 62.5 per cent was improved against 35.2 per cent in 1850. The number of farms had more than trebled in the meantime, it had increased 30.9 per cent since 1890. The average size of farms decreased in the decade, under intensive cultivation, from 119.4 acres to 93.7; the size being smallest in the northeast, the region of tobacco and corn, and largest in the stock-raising counties, but in most counties the size keeps near the average. The difference in proportion of colored population from the States where cotton is a leading crop is strikingly shown by the statistics of farm ownership and tenure. Out of 234,667 farms only 11,238 were operated by colored farmers; and as their farms averaged only 39.9 acres, they farmed only two per cent. of the land. The most conspicuous change in the decade was that of tenure, the number of cash tenants remained about the same, that of share tenants doubled. But the owned farms were over two thirds of the whole.

The great specialty of Kentucky, and its principal sale crop (most of the cereals being used in the State), is tobacco. In 1900 it not only produced two and a half times the amount of any other State,—314,288,050 pounds, valued at \$18,541,982, against 127,000,000 and 122,000,000 for North Carolina and Virginia respectively—but 36 per cent of the entire product of the United States. This was an increase of 41.6 per cent over 1890, and the largest crop ever reported. The yield averaged 816.7 pounds per acre, and the price 5.9 cents per pound. The preeminence of Kentucky in this is due not only to the favorable constituents of the soil for the plant's growth, but to the sunny equable climate, free from those violent extremes which are death to the delicate plant. The leading section is the west: Christian and Daviess counties head the list. Hemp is a famous product as being almost peculiar to Kentucky; but other fibres have driven it out of the market very largely, and it is of minor practical importance, having steadily declined since 1850. In that year it reached its climax, 78,818,000 pounds; in 1899 it was only 10,303,560, valued at \$68,454, a decrease of about 86.93 per cent since 1850; and was grown by 937 farmers in 17 counties, the chief being Fayette (Lexington), and the rest mainly to the south of it. The largest crop in value was corn, which has long been the great staple, not only for human food, but even more for provender and as a basis of the great distillery interest. Its acreage in 1900 was over half the total for all crops together, and more than double that for the next largest, wheat, and the crop was valued at nearly \$30,000,000. Wheat, for a long time dropping off, gained nearly 60 per cent. in the decade,

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with a total of 14,264,500 bushels, valued at \$8,923,760. Hay and forage from grasses of several different kinds on the superb pasture of the State, came next, with a total of 776,534 tons, valued at \$6,100,647; grass seed also had considerable importance. Oats and potatoes each came to the total of nearly a million and a quarter dollars; orchard fruits, nearly \$2,000,000; sweet potatoes, onions and miscellaneous vegetables, nearly \$5,000,000. Floriculture is an important industry, the receipts amounting to over \$100,000.

Stock-raising.—The mild winter climate, in which cattle can remain out all winter with little feed, the superb pasture afforded by blue grass, which forms a thick fine turf, and grows to perfection in the shade of the forests, and the abundant and excellent water, have given Kentucky unsurpassed natural advantages for rearing live stock. But these would not have availed but for a succession of breeders of rare intelligence and perseverance, who have made it the centre of the Union for high-grade blooded stock. Especially is this the case with horses. The old Virginia stock, bred from choice imported English animals, themselves bred to combine speed and endurance, were taken by the Kentucky breeders, the strains carefully kept pure except to mix with equally good fresh blood; and they have developed the finest road horses in the country. Kentucky horses it has been estimated have made three fourths of all the winnings on the American turf. There were in the State in 1900 over 450,000 horses valued at about \$23,500,000 besides some 200,000 mules and asses. Dairy products were also of high importance, furnishing nearly \$10,000,000 of product, from 364,025 cows. There were nearly 2,000,000 swine and 1,300,000 sheep, but both have been falling off for many years. The animals sold live and dead, came to about \$25,000,000; the poultry and eggs to nearly \$8,500,000.

Manufactures.—Kentucky has great natural facilities for manufacturing; her immense hard-wood forests, her large coal fields, and plentiful natural waterways, for half a century and more after her admission to the Union kept her abreast of her western neighbors. But since then, there has been a relative falling off. In part it is due to the change in distribution of industries; the development of steam navigation threw Lexington, for instance, which in 1810 had 114 manufactures, into the shade to build up the river towns. But other causes—tardiness in extending railroad facilities to the forests and coal fields is held partially accountable, but this was itself due to general business conditions, and has been mostly remedied—have retarded it relatively, though not absolutely. In 1850 the number of wage-earners was 21,476, in 1900 62,962, but the former was 2.2 per cent of the total population against Ohio's 2.6, the latter 2.9 against Ohio's 8.5. The largest growth was in the decade 1880-90, the wage-earners increasing over 50 per cent. Tobacco is the foremost manufacturing industry, as it is the foremost agricultural product, and steadily growing. In 1900 the 337 establishments employed nearly one ninth of all hands, and turned out one seventh of all the product of the State's manufactories, to a value of \$21,922,111, nearly double that for 1890. Over two thirds of this was chewing and

smoking tobacco and snuff; the cigar manufacture, though the chief early one, having declined relatively. The industry dates from the 18th century, when tobacco was legal-tender currency; every town in the State had its small cigar factories, and many of the farms worked up their own product. Louisville has been for many years a principal leaf-tobacco market of the world, from its great facilities for distribution by river and rail; and tobacco industries of other kinds have therefore tended to concentrate themselves there, though Owensboro and Henderson have extensive establishments which prepare leaf for shipment. Flouring and grist-milling rank next with a product in 1900 of \$14,515,161, an increase of 50 per cent. since 1890. Louisville has large flouring mills with a considerable export trade. Cottonseed oil and cake are important,—\$4,683,000 in 1900. One of the great specialties of Kentucky for over a century has been corn whiskey, known as "Bourbon" from the county of Kentucky to which a number of western Pennsylvania "moonshiners" removed after the suppression of the Whiskey Insurrection (q.v.) in 1794; but the manufacture had been already established at Louisville in 1783, in three other towns soon after, and a Maryland colony in 1787 set up a number of distilleries along Salt River. For the management of the stills, see Internal Revenue System. Since the Civil War the old farm and village distilleries, producing one or two barrels a day, have mostly given way to mammoth establishments. But the total product is heavily declining, having dropped from \$15,159,648 in 1890 to \$9,786,527 in 1900. The manufacture of malt liquors, on the contrary, increased about one fourth; and is mostly concentrated in Louisville. In May 1902 there were 339 distilleries. The internal revenue receipts from the State in that year, mostly from liquors and tobacco, were \$21,096,013.

Pork packing was an early industry in Kentucky, and from the first centred in Louisville. Louisville and Cincinnati were long the rival heads of the slaughtering and meat packing business in the United States; but the great northwestern grain fields have taken it from the Ohio Valley. The use of artificial ice, permitting summer packing, has caused a great revival of it in Louisville. The fortunes of packing and of mere slaughtering, however, are singularly in reverse; the former dropped in the decade from \$2,966,227 to \$635,685; the latter increased from \$405,784 to \$5,081,482. From the hides of these cattle was made leather to the value of \$3,757,016. The chief agent is the bark of the chestnut oak, which is not only excellent for tanning, but has the great advantage over hemlock that cutting down the tree does not necessarily kill it as it does the latter; shoots spring from the stump, if the tree is not too old, and in about 20 years are fit for another stripping. The first large custom tannery was started at Louisville in 1848; that city now has a number, and is the centre of the manufacture, the establishments outside having mostly been abandoned. Sole leather and harness leather are the principal products, although some sheepskins are tanned for the manufacture of shoes and saddles. The industry has declined somewhat since 1883, its climax, but is still one of the leading specialties.

The exploitation of the rich forests now

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going on its shown by the increase of lumber and timber products, from \$7,904,428 in 1890 to \$13,774,911 in 1900. Logging is an extensive industry on the upper waters of the Cumberland, Kentucky, and Licking Rivers; and the government improvements in the Kentucky, Green, and other rivers enable logs to be floated almost from their original home to the Ohio.

Of iron and steel, there were in 1900 eight establishments, employing 2,402 hands and turning out \$6,676,093 worth of goods, an increase in the decade of over 150 per cent. The early furnaces were abandoned for lack of transportation facilities; in 1846 others were built at Eddyville on the lower Cumberland by William Kelly; and in 1851, five years before Bessemer patented his pneumatic process, Kelly began his "air-boiling" process, essentially the same, for turning iron into steel. During these years steamboats built at Cincinnati were using boiler plate practically the same as the Bessemer, but made by the Kelly process; and the latter finally secured a royalty.

Louisville is also one of the great centres of the manufacture of jeans clothing, from cloth made largely in the State mills; but of late years this has been partly replaced by the cassettes. Louisville produces over half the total manufacturing product of the State, and its relative share is increasing.

Transportation.—Kentucky has 813 miles of navigable water on its boundary alone,—the Ohio 643 miles, the Mississippi west 50 miles, the Big Sandy east 120 miles. The Cumberland and Tennessee are navigated their entire course in the State; the Kentucky, Licking, Salt, and Green are more or less navigable for considerable portions of their lower courses, and some improvements have been made by dams and locks, but are little used. The great canal around the falls of the Ohio at Louisville has largely increased the value of that channel, which with the strip of the Mississippi is the creator of the State's commerce. The railroad system of the State has been greatly hampered by the difficulty of approach from the southeast over the mountains: several thousand square miles of this section, in a solid block, have not a mile of railroad track. This mountain district is a part of Appalachian America (q.v.) and presents, along with interesting Saxon survivals, grave problems in education and the enforcement of law. As the great transcontinental lines run mostly north of it, moreover, it has not been developed as other sections. The State has now about 3,300 miles of railroad in operation; the chief systems are the Louisville & Nashville, the Queen & Crescent, the Illinois Central, and the Chesapeake & Ohio.

Banks.—For the establishment of the banking system, see *History*. The great landmarks are the establishment of the Bank of Kentucky at Frankfort in 1806, and that of the Louisville clearing-house in 1875, which has more than once saved the more solid banks of the State from catastrophe. In 1902 there were 95 national banks in operation, with capital of \$13,334,000, surplus of \$4,015,000, cash and other items, \$3,904,000, loans \$37,976,000, deposits \$30,577,000; 229 State banks, with \$9,264,000 capital, \$2,110,000 surplus, \$3,805,000 cash, etc., \$29,999,000 loans, \$32,045,000 deposits; and 22 private banks, with \$606,000 capital, \$163,000 surplus, \$297,000 cash, etc., \$2,513,000 loans,

\$3,233,000 deposits. The exchanges of the United States clearing-house at Louisville and Lexington for the year ending 30 Sept. 1901 aggregated \$480,595,304.

Education.—In 1901 there were 7,900 white and 1,157 colored teachers in the State, the males slightly in excess among the white teachers, females considerably so among the colored; average monthly salary of whites \$40.00, of colored \$29.95; of men \$44.03, of women \$37.18. The average length of school term was 115 days; this, however, does less than justice to the cities and much more than justice to the rural districts. Entering the Union at an early date, Kentucky failed to receive the land grants which have given rise to large school funds in some other States; and the sentiment for universal education could not become prevalent until after the abolition of slavery. In the cities and among the wealthy, private schools absorbed the interest of the people, so that public education languished until recent years. At present many of the cities and larger towns, as Louisville and Ashland, have very creditable public high schools. The condition of the rural schools is unsatisfactory. The unpaid local trustees prove inefficient, and the erection of school-houses is hindered by legal difficulties over the raising of taxes. School legislation has been wisely adapted to meet the conditions in which the State is placed. The local teachers are paid from a general State fund, so that the richer portions of the commonwealth assist the poorer parts. The election of a superintendent of public instruction in each county is an arrangement contributing to progress. The public instruction provided for the colored people is in separate schools under colored teachers. The difficulties of maintaining schools in the mountain counties, and the impossibility of at once bringing under instruction the negro population, formerly enslaved, gives the State a poor showing in the matter of illiteracy. However, Kentucky is in better condition than most southern commonwealths and shows gratifying evidences of progress: 139 per cent. of its white voters are illiterate, and 49.5 per cent. of its negro voters. The expenditures for school purposes in 1900 were \$2,650,100.

For higher education there were in 1900, 69 public high schools, 82 private secondary schools, 6 public and 8 private normal schools, 13 colleges for men, or coeducational, and 11 colleges for women alone. The Kentucky University, which has had a long and varied history, is now controlled by the Disciple denomination. Center College at Danville (Presbyterian) has been the Alma Mater of many distinguished men, and recently, in combining with Central University, has taken that name. Other schools under religious auspices are, Georgetown College (Baptist) at Georgetown; and Wesleyan College (Methodist, South) at Winchester; Berea College (religious but not sectarian) at Berea, was founded by the anti-slavery element which existed in Kentucky before the War, and has in addition to the ordinary college courses, large normal and industrial departments with special adaptations to the needs of the mountain region. Receiving "all young people of good moral character" it has an attendance of colored students comprising about one seventh of the whole number. The "State College" at Lexington occupies the position of a State uni-

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versity, enjoying the funds provided by the United States government for "instruction in Agriculture and the Mechanic Arts," and affording special opportunities for the study of the natural sciences. The medical schools of Louisville are attaining reputation and importance. And that city is also the seat of a Baptist and a Presbyterian Theological Seminary.

Churches.—No religious census has been taken since 1890; but no considerable changes have taken place since that date, when the Baptists were far in the ascendant, though divided into "missionary," "predestinarian," and other varieties. Methodist Episcopal South is next in size; then came in order the Disciples of Christ, the Methodist Episcopal, the Colored Baptist, the Roman Catholic, the Cumberland Presbyterian, the African M. E., the African M. E. Zion, and the Protestant Episcopal.

Charitable and Penal Institutions.—There are insane asylums at Lexington, Hopkinsville, and Anchorage; a notable institution for the education of the blind at Louisville; a State school for deaf-mutes at Danville; and an institution for feeble-minded children at Frankfort, which, however, restricts the ages to the period of six to 18, and requires that they shall not be too feeble-minded for training. The State penitentiaries are at Frankfort and Eddyville.

Government.—The State officers are elected for four years, on the November preceding the Presidential election; they cannot be re-elected. The governor has a veto by items, but a majority vote overrides it. If he dies in the first two years of his term, a new election is held; if later, the lieutenant-governor and the president of the senate succeed in order. The legislature consists of 38 senators chosen for four years, and 100 representatives for two years. Sessions are biennial, and limited to 60 days (legislative days). Provisions concerning revenue bills and impeachments follow the model of Congress. Women (by a law of 1902) can hold office on school boards. No State, county, city, or town officers except members of city legislative boards can be elected in the year of a Presidential election. The judiciary is headed by a Court of Appeals, consisting of not over seven or under five elective judges, with terms of eight years. There are no townships, only "magisterial districts," and the county, as in old Virginia is the political unit. Each county is entitled to three sittings of a circuit court each year. The circuit judges are elected for six years, in districts. There is a county judge, and a monthly court day. County officers are elected for four years, except a circuit court clerk for two years, and the sheriff is ineligible to re-election except in alternate terms. Counties must have a minimum area of 400 square miles, and the county-seat must be at least ten miles from the boundary. There are 11 representatives in Congress.

Finance.—The State's assessed valuation in 1902 was \$667,056,375; the bonded debt, \$1,171,394. The tax rate was \$5 per \$1,000. The State revenues are divided into "funds," for different departments; the "general expenditure" fund is unfortunately fixed too low and entirely inadequate to the needful expenses, so that the State expends about double the amount of the fund, giving an appearance of a large deficit which is not correct as to the resources or in-

come as a whole. The financial world, however, takes note of this fact, and Kentucky has perfectly good credit.

Population.—The population of the State at the various censuses has been as follows: 1790, 73,677; 1800, 220,955; 1810, 406,511; 1820, 564,135; 1830, 687,917; 1840, 779,828; 1850, 982,405; 1860, 1,155,684, including 10,684 free negroes, and 210,981 slaves; 1870, 1,648,690; 1880, 1,858,635; 1900, 2,147,174. The foreign-born were but 50,249; considerably more than half Germans, about 10,000 Irish. The colored population was 284,865, not so large as in 10 other States, and not so large a percentage as in 17 others; nor are the colored people increasing so fast as the whites, there having been a relative decrease for the past two decades. The agricultural characteristics of the State have prevented the over-development of specially slave industries, and the mountain districts of course have very few. There seems also to have been some tendency among the negroes to emigrate, and a large emigration of whites is continually going on, so that natives of Kentucky form a notable element in Ohio, Indiana, Missouri and the West.

The one great independent city of Kentucky is Louisville (204,731) at the falls of the Ohio, the third in size on the river, excelled only by Cincinnati and Pittsburg. Covington (42,938), Newport (28,301), Bellevue (6,332) and Dayton (6,104) are virtually suburbs of Cincinnati, the first-named west of the Licking, the last three east of it. Other cities on the Ohio, which monopolizes much the greater part of the urban development and manufacturing of the State, are in the west, Paducah (19,446) at the mouth of the Tennessee, Owensboro (13,189) and Henderson (10,272); in the northeast, Maysville (6,423); on the east, Ashland (6,800), now the head of a rapidly growing iron district. Lexington (26,369), formerly the capital, once called "Athens of the West," is the head of the Blue Grass region. Frankfort (9,487), the capital, on a magnificent gorge of the Kentucky River; Bowling Green (8,226), the head of navigation on the Barren River, a tributary of the Green; Hopkinsville (7,280) in the southwest; and Winchester (5,964) in the north centre, are the only other places of over 5,000.

History.—The earliest explorers found this territory, though formerly inhabited by mound-building, agricultural Indians and presenting every advantage to such tribes, practically deserted, save at two points on the Mississippi and Ohio. It was a ground contested by powerful tribes, who slaughtered any others attempting to hunt there. Kentucky was originally a part of Fincastle County, Virginia, explored by Boone and his companions, as well as previous travelers, soon after 1760. The first settlement was at Harrodsburg in 1774. Boonesborough was founded the following year. With the exception of French settlements, these two towns are the oldest in the West. In the former year the victory at Point Pleasant forced the northwestern Indians to give up their claims, and the "Transylvania Company" (Richard Henderson and associates) bought about 2,500 square miles west of the Kentucky River, from the Cherokees, whose chief told Henderson he "had bought a fine territory but might have some little difficulty in occupying it"; in fact, the settlement was harassed by bloody Indian wars, and

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the North American squadron in Hampton Roads. He was placed in command of the Channel fleet in 1778, and in July of that year engaged the French fleet off Ushant. Having become partly disabled he signaled for his van and rear divisions, but Palliser in command of the rear ignored the signal until too late. Palliser accused him of incapacity and cowardice, but Keppel was honorably acquitted. In 1782 he was raised to the peerage under the title of Viscount Keppel and Baron Eldon. He was first lord of the admiralty 1782-3.

Keppeler, Joseph, American caricaturist: b. Vienna, Austria, 1 Feb. 1838; d. New York 19 Feb. 1894. He early made his reputation as a satiric artist and the leading periodicals of his native city were publishing his witty sketches, almost before he had left the Academy of Fine Arts. But art was not then a serious business to him, and he took to the stage as a comedian and opera singer, and actually began to study medicine at St. Louis, Mo., where he made his residence in 1868. But it was in St. Louis that he found his real vocation. There he established the German 'Puck,' which, while it failed as a commercial enterprise, made his reputation. It was seen at once that a caricaturist of rare skill as a draftsman, of mental fertility and freshness, of witty and incisive satire, had appeared. He was engaged from 1872 to 1877 as caricaturist for 'Frank Leslie's Illustrated Newspaper' in New York, to which city he had removed, and in 1875 he started a New York German 'Puck' in association with Adolph Schwartzman. This was followed in 1877 by the English 'Puck.' He was the first to use colored cartoons in caricature, and drew upon a vast store of classical and historical incidents for adaptation in criticising modern social and political life.

Ker'atin (from Gr. *keras*, a horn), a substance obtained from claws, feathers, hair, horn, nails, wool, and other epidermal appendages. This tissue or substance is distinguished from gelatinous tissue by becoming soft when acted on by water for some time, but no glue is produced. It is insoluble in alcohol and in ether.

Kerguelen (kér'gél-lén) Land, or Desolation Island, an island in the Indian Ocean, intersected by lat. 49° 3' S., lon. 68° 18' E.; length about 100 miles; greatest breadth about 50 miles. It has a remarkably barren and desolate appearance, due to the fact that it consists of lofty masses of basalt and other volcanic rocks. These rise to the height of 2,500 feet, presenting numerous bold headlands and ranges of precipitous cliffs, and possessing a very scanty vegetation. Sea-fowl are numerous, but no land animals are known to exist on it. Its indentations furnish several bays and inlets affording good harbors. It was annexed by France in 1893, and some settlers have made their abode there. Of the flora, which is arctic, the most noteworthy species is the Kerguelen cabbage (*Pringlea antiscorbutica*), a large edible plant, in many ways resembling common garden cabbage, and which has been valued on account of its antiscorbutic properties.

Kermes, kér'méz, dried female scale insects (*Coccus ilicis*) found in many parts of Asia and South Europe on the leaves of an oak (*Quercus coccifera*), supplying a durable

red and scarlet dye. They have been utilized for dyeing purposes in the East from very ancient times, but since the introduction of cochineal (q.v.) their use is confined to the Eastern countries and Spain, where the collection of these insects still gives employment to a number of people, but is diminishing under the competition of the aniline dyes.

Kermes Mineral, a name given to amorphous antimony trisulphide. The native antimony trisulphide occurs in well-developed orthorhombic prisms. When this compound is fused for some time, and suddenly thrown into cold water, its crystalline structure is entirely destroyed. Kermes is a brown-red powder, becoming blackish-gray when washed with boiling water. By fusion it may be obtained as a solid mass, but it is totally devoid of crystalline structure. See ANTIMONY.

Kermess, kér'méz, **Kirmess**, or **Kermis**, formerly a church festival held by the Dutch and in Flanders, and later in other parts of Europe, on the feast-day of the principal saint of a place or church. In the United States the word has come into general use for entertainments given for charitable purposes.

Kern (kérn) Lake, a body of water in Kern County, in the southern part of California; one of a small group of basins in the midst of an almost arid part of the State. Part of the year there is no apparent outlet, but at the period of high water the lake overflows into Kern River. The country around this lake and in the vicinity is noted for its large amount of game.

Kern River, a stream in the southern part of California; almost its whole course is among the mountains of the southeast. The country in the vicinity is noted for game, and at one time valuable mining interests. In the western part of Kern County, the slough of the Kern River occupies an area of about 80 square miles. It flows into Tulare Lake. The Edison Company of Los Angeles are using the valuable water power of this river for their electric-power plant established on this river.

Kernahan, kér'ná-an, **Coulson**, English novelist: b. Ilfracombe, Devonshire, 1 Aug. 1858. He was educated at St. Albans, and afterward privately by his father, a scientist and Biblical scholar. He has contributed to most of the principal English and American periodicals, and has written: 'A Dead Man's Diary'; 'A Book of Strange Sins'; 'Sorrow and Song'; 'God and the Ant'; 'The Child, the Wise Man and the Devil'; 'A Literary Gent'; etc. He has been for many years literary adviser to Ward, Lock, and Company.

Kernstown, Battle of. Gen. "Stonewall" Jackson abandoned Winchester, Va., 11 March 1862 and retreated up the Shenandoah Valley, followed by Shields' Union division beyond Strasburg. Shields was recalled to Winchester on the 20th, and Jackson followed him, his advance cavalry under Turner Ashby engaging Shields on the afternoon of the 22d, near Kernstown, in which Shields received a severe shell-wound. Jackson came up on the afternoon of the 23d and, being informed that Williams' division of Banks' corps had left Winchester and was moving through the Blue Ridge for Manassas Junction, and that Shields had but four regi-

KERNSTOWN—KERR

ments in his front, determined to crush these and thus recall Williams and detain him in the valley. Shields had nearly 8,000 infantry and cavalry and 24 guns, two of his brigades on a ridge covering the road half a mile north of Kernstown, both under command of Col. N. Kimball. Jackson had about 3,000 infantry and 27 guns. Kimball was too well posted to be attacked in front, so leaving Ashby with the cavalry and a small brigade of infantry to hold the road and threaten Kimball's centre and left, Jackson seized a low ridge on Kimball's right, and placed on it his artillery and infantry. Tyler's brigade, which had been held in reserve, was brought up and made unsuccessful efforts to dislodge him, upon which Kimball, drawing from his left and centre, formed a column of seven regiments and, under a terrific fire of artillery and musketry, led it forward, came up on Tyler's left and after a fierce combat broke Jackson's line. Kimball pressed his advantage, and as night closed in, Jackson was in full retreat, leaving his dead and wounded and two guns on the field of his first defeat. He said that he considered the engagement "a fiercer fight during its continuance than any portion of the battle of Manassas." The Union loss was 118 killed, 450 wounded, and 22 missing; the Confederate loss, 80 killed, 375 wounded, and 263 missing. Consult: "Official Records," Vol. XII.; Allan, "Jackson's Valley Campaign"; The Century Company's "Battles and Leaders of the Civil War," Vol. II.

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Kernstown (Winchester), Second Battle of. On 22 July 1864 Gen. Crook, with four small divisions of infantry and cavalry, joined Gen. Averell's cavalry division at Winchester, Va., Crook assuming chief command of the united force of 11,000 men. On the 23d Crook advanced four miles south to Kernstown and skirmished with Confederate cavalry, and on the 24th went into position on the same ground held by the Union troops in the battle of 23 March 1862. The infantry divisions of Cols. Thoburn, Duval, and Mulligan covered the valley pike, with the cavalry of Duffié and Averell on either flank. Upon the approach of the enemy Averell was sent down the Front Royal road to turn his right. Gen. Early, who, after his raid on Washington, had recrossed the Potomac and taken position beyond Cedar Creek on the 21st, hearing of Crook's advance, put all his army in motion on the morning of the 24th to attack him. At Bartonsville Ramsour's division moved by a road to get around Crook's right, while the divisions of Gordon, Rodes, Breckinridge, and Wharton moved along the valley pike and on either side of it. The cavalry was divided and moved in two columns, one on the right along the Front Royal and Winchester road, the other on the left and west of Winchester, the two to unite in rear of Winchester and cut off Crook's retreat. At 10 A.M. Crook's skirmishers were driven in, and it was discovered that his left extended through Kernstown, and that Averell having left, that flank was exposed; whereupon Wharton's division was moved under cover of some ravines on the right to attack it. The movement was promptly executed, and Wharton struck the left flank and rear of Col. Rutherford B. Hayes' command as it was advancing and threw its left

into some confusion. Hayes changed front and, forming behind a stone fence, held Wharton in temporary check. Almost simultaneously with Wharton's flank attack, Rodes, Gordon, and Ramseur advanced on Crook's centre and right, and the entire line gave way and retreated through Winchester, followed by Early's infantry and artillery beyond Winchester, and by Rodes' division as far as Stephenson's Depot. The retreat was continued on the 25th through Martinsburg to the Potomac, Crook crossing at Williamsport and marching down the north side of the river to Maryland Heights and Harper's Ferry. Early occupied Martinsburg and began the destruction of the Baltimore & Ohio railroad. The Union loss, 23–26 July, was 100 killed, 606 wounded, and 479 missing. Among the mortally wounded was Col. Mulligan, commanding division. The Confederate loss is not accurately known, but it was comparatively light. Consult: "Official Records," Vol. XXXVII.; Pond, "The Shenandoah Valley in 1864"; The Century Company's "Battles and Leaders of the Civil War," Vol. IV.

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Ker'osene, an illuminating oil; the principal product of the distillation of petroleum, the crude domestic oil yielding 70 per cent. of its weight. The oil is colorless, possessing a characteristic taste and smell; insoluble in water, moderately soluble in alcohol, but very soluble in ether, chloroform, and benzene. It dissolves camphor, iodine, phosphorus, sulphur, fats, wax, and many resins. The flashing point of a safe kerosene should not be less than 34°, and the igniting point 43°. The finest quality of illuminating oil is produced from distillates ranging in specific gravity from 0.775 to 0.780. It has a high flashing point, 48° to 60°, and contains none of the lighter parts of the crude oil. A good illuminating oil should neither be too viscous nor too volatile, and it should not take fire when a light is applied to it. See Oil; PETROLEUM.

Kerr, kér, Michael Crawford, American politician: b. Titusville, Pa., 15 March 1827; d. Rockbridge, Alum Springs, Va., 19 Aug. 1876. He was graduated from the law school of Louisville University in 1851. The next year he moved to New Albany, Ind., and began the practice of his profession; in 1854 he was city attorney, and in 1855 prosecuting attorney for the county. In 1856 he was elected to the State legislature; in 1862 he was reporter for the supreme court of Indiana, and published five volumes of reports of unusual value. In 1864 he was elected to Congress as a War Democrat, and served till 1872. In that year he refused the nomination from his own district, but ran as congressman-at-large, and was defeated by a very small majority; in 1874 he was re-elected to Congress in spite of much opposition, and was made speaker on the organization of the House. He served however only during the first session of that Congress (the 44th), as he died four days after its adjournment. While a member of the House he served on several important committees, including the committee of ways and means; he opposed the reconstruction policy of the Republican party and was an advocate of free trade. He was also a close student of financial problems, favored the resumption of specie payment, and was strongly

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against the Greenback movement in regard to which he opposed a large part of his constituency and many of the politicians of his State.

Kerr, Orpheus C. See NEWELL, ROBERT HENRY.

Ker'ril, a sea-snake (*Distira cyanocincta*), olive with blue-black bands, numerous along the coasts from Persia to Japan, and considered one of the most venomous of its race. See SEA-SNAKE.

Kerrville, kér'vil, Texas, town, county-seat of Kerr County; on the Guadalupe River, and on a branch of the San Antonio & A. P. railroad. It is situated in an excellent agricultural region in which cotton cultivation and sheep raising are the principal occupations. The altitude of the town is about 1,800 feet, which accounts for its agreeable climate. The chief industrial establishments are stock-yards, flour-mills, cotton gins and, in the vicinity, stone quarries. The town has considerable trade in lumber, and is one of the principal wool markets of the State. Pop. (1900) 1,423.

Kersey, kér'zí, a kind of woolen cloth, differing from broadcloth by being woven as a twill. A very thin fine variety of kersey is called cassimere.

Ker'shaw, Joseph Brevard, American soldier: b. Camden, S. C., 5 Jan. 1822; d. there 13 April 1894. He entered the Confederate army at the outbreak of the Civil War, and as brigadier-general commanded a brigade in the Peninsular campaign of 1862. He took part in the capture of Harper's Ferry, 15 Sept. 1862, and was active at Antietam, Fredericksburg, Chancellorsville, Gettysburg, and Chickamauga. After the War he became president of the South Carolina Senate, and was judge of the 5th circuit of South Carolina, 1877-93.

Kes'trel, one of the smaller of the European falcons (*Tinnunculus alaudarius*), resembling the sparrow-hawk, and formerly much used in falconry by the peasantry. The American sparrow-hawk and sharpshin (qq.v.) may be called kestrels.

Ketch, a vessel equipped with two masts, namely, the mainmast and the mizzenmast, and usually from 100 to 250 tons burden. Ketches were principally used in former times as yachts for conveying princes of the blood, ambassadors, or other great personages from one place to another. Ketches in use at the present day are chiefly coasters.

Ketones, két'ōnz. See ACETONE.

Ketteler, két'tél-ér, Clemens August, BARON von, German diplomat: b. Potsdam 1853; d. Peking 20 June 1900. He served for a time in the army, but entered the diplomatic service, in 1882 as attaché at Peking drew up the first treaty between Germany and Korea, in 1883 was appointed acting consul at Canton, in 1892 became secretary of the German legation at Washington, and when in 1893 the legation was made an embassy was appointed first secretary to the embassy and counsellor of state. In 1896 he became minister to Mexico, in 1899 minister to China. In 1900, at the time of the "Boxer" disturbance in northern China, he was selected, owing to his familiarity with the Chinese language, to represent the foreign diplomats in their communications with the govern-

ment. While on such a mission he was shot in the street. Prince Chun, brother of the emperor, was sent to Germany to apologize for the murder, and 18 Jan. 1903 a memorial arch, set up at the expense of the Chinese government, was dedicated at Peking.

Kettle Drum, a musical instrument, formed of thin copper, and has a head of parchment or vellum. Kettle drums are used in pairs, slung on each side of the withers of a cavalry horse. One drum is tuned to the key note, and the other to the fifth of the key in which the piece in which they are to be used is written. The tuning is by a hoop and screws. Also a name for a tea party held by fashionable people in the afternoon before dinner.

Ketu'pa, the generic and vernacular name of a group of large owls of the East Indies, specifically the Javan one (*K. javanensis*), which subsist mainly on fish, crabs, and the like, which they are expert in catching along the shores of sea and rivers. Their legs and talons are long and not feathered.

Keuka (ké-u'ka) Lake, or Crooked Lake, a body of water in New York State extending from Steuben County to Yates County, a distance of 20 miles. It is about 2 miles wide and of irregular form. It has a depth of 200 feet and lies 718 feet above the sea. Steamboats navigate the lake in summer between Hammondsport and Penn Yan.

Keuka, College, N. Y., a college at Keuka Park; founded in 1892 under the auspices of the Free Baptists. It had in 1901: Professors and instructors, 15; students, 176; volumes in the library, 3,000; productive funds, \$150,000; income, \$11,000.

Kew, kū, England, a small village in the county of Surrey, on the right bank of the Thames, opposite Brentford, with which it is connected by a bridge. The royal botanic gardens and the connected pleasure-grounds, the former covering about 75 acres, the latter 250, are the chief attraction of visitors to Kew. They contain the finest collection of plants in the world, and are decorated with various ornamental buildings, including a Chinese pagoda 163 feet high. The botanical constructions here are really magnificent, and have been much augmented in recent years; they include a great conservatory for palms, tree-ferns, and other tropical plants, 362 feet long altogether, the centre portion being 137 feet 6 inches long, 100 feet wide, and 69 feet high, the wings 50 feet wide and 33 feet high; a house for succulent plants, such as cactuses, euphorbias, etc., 200 feet long and 30 wide; a great "temperate house" for trees and shrubs of temperate climates that require protection during the winter; a large orangery, hothouses, greenhouses, etc., of great size. The gardens are open to the public on Sundays as well as week days.

Kew Observatory, a celebrated astronomical structure in Richmond Park, between Kew and Richmond, Surrey, England. It was built by George III. as a private enterprise for the observation of the transit of Venus in 1769 and was then called the King's Observatory. It was transferred to the British Association as a physical observatory in 1841, and given its present name. In 1871 it was placed under the control of the Royal Society.

KEWANEE — KEY WEST

Kewanee, ke-wā'nē, Ill., city in Henry County; on the Chicago, B. & Q. railroad; about 100 miles north by west of Springfield and 122 miles southwest of Chicago. It is situated in an agricultural region, and coal-fields are in the vicinity. The chief manufactures are agricultural implements, boilers, pumps, steam-heating machinery, gloves, mittens, and carriages and wagons. The tube and boiler works employ about 3,520 men. The public library has about 10,000 volumes. The city owns and operates the waterworks. Pop. (1890) 4,569; (1900) 8,382.

Kewa'tin. See KEEWATIN.

Kewaunee, ke-wā'nē, Wis., city, county-seat of Kewaunee County; on Lake Michigan at the mouth of the Kewaunee River, and on the Kewaunee, G. B. & W. railroad. The first permanent settlement was made in 1850, and the city received its charter in 1882. Its chief industrial establishments are foundries, machine-shops, pea-canning works and coffin factory. Pop. (1900) 1,773.

Keweenaw (kē'wē-nā) Bay, an arm of Lake Superior, north of Michigan. It is 8 miles long, by 2 to 6 miles in length. The town of Baraga lies at the head of the bay.

Keweenaw Point, a peninsula in northern Michigan, projecting into Lake Superior. It is rich in copper mines, the maximum thickness of the strata here being 40,000 feet. The peninsula is as large as the State of Delaware, and includes Houghton and Keweenaw counties. Among the towns on the peninsula are Calumet, Houghton, Eagle Harbor, and Copper Harbor.

Keweenawan (kē'wē-nā-an) Series, a great series of rocks, believed to be of Pre-Cambrian age, typically developed on Keweenaw Point, Mich., but found over a large area in Michigan, Wisconsin, and Minnesota. Rocks of the same age occur also in Canada, and possibly in the Adirondack Mountains in New York. The series on Keweenaw Point and southward has a maximum thickness of perhaps 50,000 feet; the lower part consists mostly of thick sheets of lava and intrusive rocks with some sandstone and conglomerate; the upper part is a mass of sedimentary rocks. In the series occur the famous Lake Superior copper deposits. The Keweenawan series is included in the Algongkian or Eozoic system.

Key, David McKendree, American jurist and cabinet officer: b. Greene County, Tenn., 1824; d. Chattanooga, Tenn., 3 Feb. 1900. After studying law he was admitted to the bar in 1849, and in 1853 took up his residence in Tennessee, establishing a successful law practice at Chattanooga. After vainly attempting to prevent the secession of Tennessee, when once that step was taken he joined the Confederate army and served through the War, but at its close joined the Republican party, succeeded Andrew Johnson in the United States Senate (1875); in 1877 was made postmaster-general; and in 1880 was appointed United States district judge for the Eastern and Middle Districts of Tennessee, a position he held till his death.

Key, Francis Scott, American lawyer and song writer: b. Frederick County, Md., 1 Aug. 1779; d. Baltimore 11 Jan. 1843. He was educated at St. John's College, Annapolis, and com-

menced the practice of the law in Frederic City. Subsequently he removed to Washington, where he was for many years district attorney of the District of Columbia. As a song writer he is chiefly known by his 'Star-Spangled Banner,' a popular national lyric, suggested and partially written while the author was detained in the British fleet during the bombardment of Fort McHenry, near Baltimore, of which he was an anxious and interested witness. A posthumous collection of his miscellaneous poems was published in 1856.

Key, in music: (1) A mechanical contrivance for closing or opening ventages, as in flutes, clarinets, ophicleides, etc. By means of keys on such instruments, apertures too remote to be reached by the outstretched fingers are brought under control of the player. (2) A lever which brings the pallets of an organ under the control of the hand or foot of an organist. (3) A lever which controls the striking apparatus of a key-stringed instrument. In the harpsichord it acted on the jack; in the pianoforte it acts on the hammer. (4) The wrest or key used for tuning instruments having metal pegs. Its end is hollowed out so as to fit over the four-sided end of the peg, and the cross-bar with which it is surmounted gives leverage to the hand of the tuner, so that he is enabled to tighten or loosen a string, or (in the case of a drum) slacken or strain a parchment. (5) The sign placed at the commencement of the musical stave which shows the pitch of the notes, was originally called a clavis or key. This sign is called in modern music a clef. (6) Key, in its modern sense, is the starting point of the definite series of sounds which form the recognized scale. Different starting points require the relative proportion of the steps of the scale to be maintained by means of sharps or flats in the signature. The key of C major requires no flats or sharps for this purpose, hence it is called the normal key.

Also a metallic instrument for shooting the lock-bolt of a door; an instrument formed with cavities or interstices corresponding to the wards of a lock, by which the bolt is moved backward or forward.

Key West, Fla., city, port of entry, county-seat of Monroe County; about 60 miles southwest of Cape Sable and nearly 100 miles north by east of Havana, Cuba. The city is on Key West Island, one of a group of coral islands, called Florida Keys. It is the farthest south of any city in the United States. The first permanent settlement was made in 1822 and the city received its charter in 1832. Key West Island is covered by only a thin layer of soil upon which vegetation grows luxuriantly. The island averages about 11 feet above the sea. The harbor is excellent; at the main entrance, on an artificial island, is located Fort Taylor. The city has regular steamer communication with the large cities on the Atlantic and Gulf coasts and with the West Indies and Central America. It is a United States naval station, and during the war with Spain, it was the rendezvous of the United States navy. The chief industries are manufacturing of cigars, gathering sponges, and fishing. There is a large trade in fish, fruit, vegetables, turtles, turtle-shell ornaments, salt, tobacco, both raw and manufactured. In connection with the naval

KEYES—KHARGEH

station there are barracks, machine-shops, marine hospital, docks, etc. Some of the chief public buildings are the government buildings, post-office and custom-house, county court-house, city-hall, and the Martello towers. The principal educational institutions are a Methodist Seminary and the Holy Name Academy. The convent of the Holy Name was used as a hospital for soldiers during the Spanish war. The free public library and the public and parish schools are excellent. There are two banks with a combined capital of \$150,000. The government has erected two light-houses in the harbor and others among the islands; but still many wrecks occur each year. The city owns and operates the waterworks. Pop. (1900) 17,114.

Keyes, kēz, Edward Laurence, American surgeon: b. Charleston, S. C., 28 Aug. 1843. He is a son of Erasmus Keyes (q.v.) and was graduated from Yale in 1863 and from the medical department of the University of New York in 1866. He has practised his profession in New York from 1867, and is now (1903) consulting surgeon to Bellevue Hospital. He has published: 'The Venereal Diseases' (1880); 'Treatise on Surgical Diseases of the Genito-Urinary Organs' (1881); etc.

Keyes, Emerson Willard, American educator and financial writer: b. Jamestown, N. Y., 30 June 1828; d. 13 Oct. 1897. He graduated from the State Normal School, was deputy superintendent of public instruction in New York 1857-65, and acting superintendent 1861-2. In the latter year he was admitted to the bar, became deputy superintendent of the banking department of New York State in 1865, and was appointed bank examiner five years later. In 1882 he was appointed chief clerk of the Brooklyn (N. Y.) Board of Education, a position which he filled until his death. He published: 'New York Court of Appeals Reports' (1867-9); 'History of Savings Banks in the United States' (1878); 'New York Code of Public Instruction' (1879); etc.

Keyes, Erasmus Darwin, American general: b. Brimfield, Mass., 29 May 1810; d. Nice, France, 11 Oct. 1895. He was graduated from West Point in 1832, and served in Charleston in 1832-3. He was later placed on frontier duty in the Northwest during the Civil War, and won distinction at Fair Oaks and elsewhere. He was promoted major-general of volunteers 5 May 1862, and on 31 May of that year was brevetted brigadier-general United States army. He resigned in 1864 and settled in California. He published 'Fifty Years' Observation of Men and Events' (1884).

Keyes, the name given to coral and other reefs or slightly sunken rocks off the shores of Florida, Central America and the West India Islands. The term is derived from the Spanish *cayo* (an islet, rock).

Keyser, ki'zér, Ephraim, American sculptor: b. Baltimore, Md., 6 Oct. 1850. On the completion of his academic course in his native city, he studied art at the Royal Academies in Munich and Berlin, where his success was marked. He has had studios in Rome, Italy, New York, and Baltimore, where he now resides, in charge of the sculpture and modeling classes at the Maryland Institute School of Art.

His most important public works are the De Kalb statue at Annapolis, Md., and President Arthur's tomb at the Rural Cemetery, Albany, N. Y. He has made numerous portrait busts, among others those of Cardinal Gibbons, Daniel Coit Gilman, and Sidney Lanier. While abroad he received the Michael Beer scholarship.

Keyser, Leander Sylvester, American Lutheran clergyman and ornithologist: b. Tuscarawas County, Ohio, 13 March 1856. After graduation from Wittenberg Divinity School he filled various Lutheran pastorates in Indiana and Ohio, and has been pastor of Midland College Church, Atchison, Kan., from 1897. He has published: 'The Only Way Out' (1888); 'Birddom' (1892); 'In Bird Land' (1894); 'Birds of the Rockies' (1902).

Keystone State, a name given to Pennsylvania, because it was the seventh, or central of the original 13 States.

Khaki, kā'kī, a kind of light-brown, drab, or dust-colored cloth, originally used for making the uniforms of East Indian regiments. In the South African war of 1899-1901 the British troops wore khaki uniforms for purposes of protective coloration, and khaki was also worn by the United States troops in the Spanish-American war.

Khalifa, kā-lē'fā, The (SAYED ABDULLAH IBU-SAVED MOHAMMED), Arab religious leader: b. Darfur 1846; d. battle of Om-Debrihat, Egypt, November, 1899. He fought against the Egyptian invasion of Darfur, and subsequently, having heard of the troubles of the Mad Mullah (q.v.), Mohammed Ahmed, with the Egyptian authorities, he visited Mohammed, and proclaimed that the latter was the divinely-sent Mahdi, or "director," appointed for the regeneration of Islam. It was by his councils that the Mahdi caused the troubles in Kordofar and Darfur. Ere long he was made "khalifa," or vice-gerent, his acts to be regarded as equivalent to the Mahdi's own. He was named by the Mahdi as successor, and from 1885 ruled over the Sudan and such adjacent districts as he brought within his sway. His capital was situated at Omdurman, near which, on 2 Sept. 1898, his army, though fighting with great bravery, was almost annihilated by the British and Egyptian forces under Sir Horatio (now Lord) Kitchener (q.v.). He escaped northward, but in November 1899 was slain at the combat of Om Debrihat. See also EGYPT—History; SUDAN.

Khammurabi. See HAMMURABI, THE CODE OF.

Khan, kān or kān, or **Caravansary**, in Turkey and other Eastern countries. There are two kinds, those for poor travelers and pilgrims, where a lodging is furnished gratis; and those for traders, which are usually more convenient, a small charge being made for each chamber.

Khandesh, khān-dēsh', or **Candeish**, British India, an inland district in the presidency of Bombay, with an area of 10,907 square miles. The chief town is Dhulia (pop. 21,880). Pop. 1,460,851.

Khargeh, khār'gē, or **Kharga**, Egypt, town, in the oasis of the same name; 100 miles west of Thebes. Here are the ruins of the temple of Ammon. Pop. 4,000.

KHARKOV—KHORASAN

Kharkov, Här-köf', or Charkov, Russia, (1) a southern government bounded north by Kursk and Voronezh; west and southwest by Poltava; south by Ekaterinoslav; east by the Don Cossacks; area, 21,041 square miles. There are forests in a few parts, but the country generally is open, the soil dry and of a mixed loamy and sandy nature, but usually fertile. The climate is mild, though the winter is somewhat severe; the summer is frequently very hot. Agriculture and the rearing of sheep and other domestic animals form the chief employment of the inhabitants. Sugar and tobacco are manufactured. Pop. (1897) 2,509,811. The principal town is (2) Kharkov, the capital, at the confluence of the Kharkovka and Lopanj, 400 miles southwest of Moscow. The houses are mostly of wood, whitewashed, and have a cleanly appearance. The city is the see of an archbishop, contains a cathedral and other churches, a university with a library, a museum and botanical garden, a technological institute and a veterinary institute, several gymnasia, two theatres, etc. The inhabitants carry on a considerable trade in soap, candles, and leather; and among the chief industries are wool-washing and the manufacture of tobacco and cigars. Pop. (1897) 174,841.

Khartum, Har-toom', or Khartoum, capital of the Egyptian Sudan, on the left bank of the Blue Nile, near its junction with the White Nile. Founded under Mchemet Ali in 1823, it rapidly rose to be the chief town of the Egyptian Sudan, but after its conquest by the Mahdi it was abandoned for Omdurman, on the opposite bank of the river. In the latter part of 1898 it was again occupied by British and Egyptian troops, who found it in a ruined and neglected condition. It is a straggling place covering a wide area, with irregular streets, and houses mostly built of sun-dried bricks. The situation of Khartum made it the emporium of a large trade in ivory, gums, ostrich feathers, senna, etc., which is again developing under Anglo-Egyptian rule. It was the scene of Gordon's heroic defense against the insurgent Sudanese, and of his death in January 1885. The Gordon College, established here after the British occupation, was named in honor of him. Pop. 40,000.

Khayyám, Omar, ö'mär khī-yām'. See OMAR KHAYYAM.

Khedive, kē-dēv' (*Khidiv*), a Persian word signifying lord, the title of the Pasha of Egypt, granted him by a firman from the sultan in 1866. In Persia it was at different eras adopted by provincial governors who were independent of the shah. The title, which had fallen into disuse both among Persian and Turkish governors, was revived in order to give additional honor to Ismail Pasha.

Khiva, hē'vā, or Chiva, a vassal state of Russia, in Central Asia. It formerly occupied a large extent of surface on both sides of the Amu-Daria or Oxus, but since the cession to Russia, in 1873, of its territory on the east of the Amu, is now confined to the west side of this river. It is of a triangular shape, each of its three sides—of which Amu forms one—being about 300 miles in length. One of its angles rests on the Sea of Aral. A great part of the surface consists of deserts, thinly inhabited or

uninhabitable; but along the Amu the land is of a very different character, consisting of rich alluvial loam of the greatest natural fertility. Owing to the great dryness of the atmosphere, however, it soon becomes so stiff and hard that it cannot be penetrated by any ordinary implement. For this the obvious remedy is irrigation; and accordingly, from the earliest period, a mode of culture resembling that of Egypt has been practised. Large canals from the river, with numerous minor branches, intersect every part of the surface, supplying moisture where it is wanted, or removing it where it is in excess, and securing the most luxuriant crops of wheat, maize, rice, barley, and legumes. Cotton and madder are also generally cultivated. The vine thrives well, but requires to be defended against the winter cold by a covering of straw and earth; all the ordinary fruits, including apples, plums, cherries, apricots, figs, and pomegranates, are common. Trade is carried on chiefly with Russia. The principal exports are raw and spun cotton, in return for which are received various articles of European manufacture, as metals and ironware, woollen, cotton, and silk goods, etc. From Bokhara also are obtained cotton and silk goods, green tea, raw tobacco, Chinese porcelain, etc. These are sometimes paid for in money, but more frequently in Russian wares. The government of Khiva is an unmitigated despotism. The greater part of the inhabitants are Tajiks and Uzbeks, in nearly equal numbers. After these are Persians, Karakalpaks, Jamshids, and Turcomans. The designs of Russia on Khiva long caused disquietude in Britain, which has always been jealous of Russian advances in Asia, mainly from a dread of interference with her Indian empire. Accordingly Count Schouvaloff was despatched to England in January 1873, to give explanations respecting an intended expedition to Khiva. Its object was represented as simply the suppression of brigandage, the recovery of a few Russian prisoners, and to teach the khan to desist from acts of violence in the future. The emperor, it was said, had given positive instructions that Khiva should not be taken possession of. In spite of these protestations, however, Khiva was taken possession of on 10 June; and later in the year, though the nominal independence of the khan was stipulated for, it was decided to annex to the Russian dominions the Khivan territory on the right bank of the Amu. The khan also renounced all right of making wars or treaties without Russian sanction. The population is estimated at 700,000 to 1,000,000.

Khokand, hō-känd'. See FERGANAH.

Khoozistan'. See ELAM.

Khorasan, ho-rä-sän', Persia, an extensive northeastern province; area, about 140,000 square miles. The surface is to a great extent uninhabitable. The mountainous region of the north has many well watered valleys with a fertile soil. The most valuable mineral is the turquoise. In many parts cotton, hemp, and tobacco grow freely, and aromatic plants and drugs are numerous and valuable. The principal manufactures are silk and woollen stuffs, carpets, firearms, and sword-blades. About two thirds of the inhabitants are Persians; the remainder are Turcomans, Kurds, and other tribes, who lead a nomadic life. The chief town is Meshed. Pop. estimated at 860,000.

KHORSABAD — KIDD

Khorsabad, khōr-sā-bād'. See NINEVER.

Khyber (hī'bér) or **Khaibar Pass**, a mountain pass on the frontiers of India and Afghanistan, leading from Punjab to Jelalabad and Cabul. The pass winds northwest through a range of hills, called by the same name, for a distance of about 33 miles, and forms the bed of two streams, the one flowing northwest, the other south-southeast. It is at one part as narrow as 10 feet in width, and in many places the hills on either side are quite precipitous and inaccessible, rising at one point to the height of 1,300 feet. At 9½ miles distance from the Indian entrance of the pass is the fort of Ali Masjid, which has several times been taken by the British from the Afghans. The highest point of the pass is Lundi Kotal, 3,373 feet above sea-level. The pass forms the northern military route from India to Afghanistan, and is now under British control.

Kiang, kē-āng', **Dziggetai** or **Kulan**, the large wild ass (q.v.) of Tibet and Mongolia, characterized by its large size (11 to 12 hands high), dark reddish color and the narrowness of the black stripe along the spine; some have faintly barred legs. They dwell upon the lofty, sterile plateaus north of the Himalayas, moving about in bands which travel at amazing speed over the stony plains and up and down the steep hillsides, feeding mainly on twigs of woody desert plants, and acquiring great hardiness. They are hunted by the Mongols as game, yet are not shy as a rule, coming close to a traveling party or camp, apparently actuated by extreme curiosity, unless driven away. The voice has been described as like the neigh of a horse; but the general and truer opinion is that it is more nearly the shrieking bray of the ass. The animal is nowhere domesticated, except a few captive specimens in zoological gardens. See ONAGER.

Kiang-Si, kē-āng'sē, or **Kiangse**, one of the 18 provinces of China proper. It is bounded on the north by Hupeh and Ngan-Hui, on the east by Che-Kiang and Fu-Kien, on the south by Kwang-Tung, and on the west by Kwang-Si and Hunan. The area is 72,176 square miles. The province contains the treaty port of Kiukiang on the Yang-tse-Kiang. The Nan-Ling or Southern Mountains traverse the eastern half of Kiang-Si, and in the north is the large inland lake of Po-Yang-Hu. Here are established famous manufactories of porcelain. The principal river aside from the Yang-tse-Kiang, is the Kin-Kiang. The province produces tea and silk, besides porcelain. The English have large railway concessions. There are telegraph lines connecting the treaty port with other centres of commerce.

Kiang-Su, kē-āng'soo, an important maritime province of China proper, bounded north by the province of Shan-Tung; east by the Yellow Sea; south by the province of Che-Kiang, and west by the provinces of Ngan-Hui and Ho-Nan. Kiang-Su has an area of 44,500 square miles (about that of Pennsylvania). The great commercial importance of this province is denoted by its possession of four treaty ports, Shanghai, Nankin, Su-Chau and Chin-Kiang. Kiang-Su was in fact the first province opened to foreign commerce by means of a treaty port. It is traversed almost its whole length by the

Grand Canal, the ancient Chinese system of waterways. The British have valuable railway concessions and the Germans claim mining rights here. Half the foreign population of China is established in this province.

The Yang-tse-Kiang empties into the sea through this province and enables it to control the trade of all southern China. There are large cotton mills. The capital of the province is Nankin, which was formerly the capital of the Chinese empire. The Tai-Ping rebellion of 1853-4 had its headquarters in this province. Kiang-Su is rapidly becoming the centre of Chinese manufacturing industries, especially in textiles. Commercially, the province is controlled by the English, who have invested largely in railways, mills, and government concessions. Pop. (1900) estimated, 28,000,000.

Kianganes, a Philippine tribe. See QUIANGANES.

Kiao-Chau, kē-ā-ō-chow', or **Kiao-Chow**, a Chinese walled city and a protectorate of the German empire, around the shores of Kiao-Chau Bay on the east coast of the province of Shan-tung. The bay is some 15 miles across from east to west and north to south, and has deep-water anchorages suitable for foreign vessels in its southeastern portion. Kiao-Chau was seized by Germany in November 1897, and in March 1898 the town, harbor, and district were transferred to Germany by treaty on a lease for 99 years, the territory, which covers about 200 square miles, being then declared a protectorate of the German empire. It comprises 33 townships, with a population of 60,000. Around the leased territory is a neutral zone of 2,500 square miles in area. The protectorate is administered by the navy department, its governor being a naval officer. The German garrison, about 2,400 strong, consists of marines and marine artillery.

Kibit'ka, a carriage without springs used in Russia; also the name of a tent used by the nomad tribes of Kirghiz Tartars.

Kickapoos, a tribe of Algonquian Indians, formerly occupying a portion of the Ohio Valley. They were a powerful nation in the early history of that region, and were constantly in arms against the whites until in 1819 they concluded the sale of most of their lands and removed to the Osage River Reservation in Kansas. In 1852 a considerable number of them went to Texas and from there to Mexico; some of these returned, however, and settled in the Indian Territory. In 1900 the total number of Kickapoos in the United States and Mexico was estimated at 1,000. See INDIANS.

Kidd, Benjamin, English sociologist: b. 9 Sept. 1858. He entered the inland revenue service of Great Britain in 1877 and rose to sudden fame by the publication of 'Social Evolution' in 1894. The volume was translated into most of the languages of Europe, and gave rise to considerable controversy, President Roosevelt publishing a series of papers in opposition of the views propounded in it. Its main proposition was that high moral and religious development in society was a process that ran exactly contrary to natural evolution and the Darwinian process of survival. He has also published: 'The Control of the Tropics' (1898); and 'Principles of Western Civilization' (1902).

KIDD — KIDNEYS

Kidd, William, American pirate: b. probably Greenock, Scotland, about the middle of the 17th century, executed London 24 May 1701. He appears to have followed the sea from his youth, and about 1695 was known as one of the boldest and most successful shipmasters that sailed from New York. At this time the depredations of pirates upon British commerce had become so extensive that a company was organized in England, in which William III. and several noblemen were shareholders, to fit out an armed vessel for the purpose of suppressing the practice, as well as of deriving a profit from captures. Kidd, who had obtained some experience as captain of a privateer against the French, received a commission signed by the king, and directed to "the trusty and well beloved Captain Kidd, commander of the ship Adventure Galley," a vessel of 30 guns. Sailing from Plymouth, England, in April 1696, he cruised off the American coast for some months, occasionally entering New York, and finally sailed for the East Indies and the east coast of Africa. Upon his way he resolved to turn pirate, and finding his crew not averse to the project, forthwith commenced a career of plunder and outrage among the shipping which frequented the coasts of Malabar and Madagascar, returning in 1698 with a large store of booty to New York. He took the precaution to bury a portion of his treasure on Gardiner's Island at the east end of Long Island, and subsequently went to Boston, where he boldly made his appearance in the streets, not doubting that under his commission he could clear himself from any charge of piracy. Such, however, had been the scandal which the report of Kidd's depredations had caused in England, that the Earl of Bellamont, governor of Massachusetts and New York, and one of the shareholders in the enterprise, caused him promptly to be arrested and conveyed to England for trial. The charge of piracy was difficult to prove; but having been arraigned for killing one of his crew, named Moore, in an altercation, he was convicted after a grossly unfair trial, and hanged at Execution dock. His name and deeds have been interwoven into popular romance, and form the subject of the well-known ballad commencing: "My name is Captain Kidd, as I sailed, as I sailed," many of the incidents of which, however, are apocryphal. The treasures he had left, consisting of 738 ounces of gold, 847 ounces of silver, and several bags of silver ornaments and precious stones, were secured by Bellamont. But according to popular belief this inconsiderable amount constituted but a tithe of all he had collected, and down to the present time the shores of Long Island Sound and various parts of the banks of the Hudson River continue occasionally to be explored in the hope of discovering the abandoned wealth of the great pirate.

Kid'der, Frank Eugene, American architect: b. Bangor, Maine, 3 Nov. 1859. He was graduated from the University of Maine in 1819, studied at the Massachusetts Institute of Technology 1880-1, and has published 'Architects' and Builders' Pocket Book' (1885); 'History of the Kidder Family' (1886); 'Churches and Chapels' (1895); 'Building Construction and Superintendence' (1896).

Kidder, Frederic, American historical writer: b. New Ipswich, N. H., 1804; d. Melrose, Mass., 1885. He gave much attention to

the language and religion of the New England Indians, and published 'The Expeditions of Capt. John Lovewell' (1865); 'History of the First New Hampshire Regiment in the War of the Revolution' (1868); 'History of the Boston Massacre' (1870); etc.

Kid'derminster Carpet, so called from being made in the town of that name in England. Another of its names, ingram, signifies that it is made of wool or worsted dyed in the grain; that is, before manufacture. Its names two-ply or three-ply indicate the number of webs which go to the making of the fabric.

Kidnapped, a romance by Robert Louis Stevenson, published in 1886, when the author was 36. In his own opinion, it was his best novel; and it is generally regarded as one of his finest performances in romantic story-telling. The full title reads: 'Kidnapped: Being Memoirs of the Adventures of David Balfour in the Year 1751'; and the contents of the tale are further indicated on the title-page, thus: "How he was Kidnapped and Cast away; his Sufferings in a Desert Isle; his Journey in the Wild Highlands; his acquaintance with Alan Breck Stewart and other notorious Highland Jacobites; with all that he Suffered at the hands of his Uncle, Ebenezer Balfour of Shaws, falsely so called."

Kid'napping, is not a legal term, but is frequently applied as such in popular language, both in Great Britain and the United States, to the offense of stealing or carrying off by force a child or adult. In its more limited sense, it is applied to the obtaining of slaves or native labor by force, as practised by the Arabs in Africa. This barbarous traffic existed in very recent years in the South Seas, carried on by Europeans, but now happily suppressed by the appointment of government labor agents. In Great Britain this term was formerly also applied to the illegitimate recruiting for the army and navy. See ABDUCTION.

Kid'ney Bean, a bean of the genus *Phaseolus*, of which European species and varieties have been cultivated from a time immemorial (see BEAN). The wild kidney bean of the United States is a high-climbing vine (*P. perennis*), bearing small purple flowers. The so-called "kidney-bean tree" is *wistaria* (q.v.).

Kidney-root, the purple boneset (q.v.).

Kidneys, the principal excreting organs of the body. They are two in number, fixed in position at the back of the abdominal cavity by a thick layer of fat and the peritoneum which passes in front of them; their lower border is slightly below the last ribs; their shape is characteristic; they have an outer, upper, and lower convex margin, and an inner margin deeply indented, allowing the entrance of the renal artery and exit for the veins and ureter. This indentation corresponds to a considerable hollowing of the interior, which is occupied by the funnel-like origin of the ureter (the pelvis). The kidney is surrounded by a firm membrane called the capsule; inside of this is the substance proper, made up of a connective-tissue groundwork in which are embedded the blood-vessels and the secreting glands called the uriniferous tubules. These tubules start in

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tiny rounded bodies (Malpighian bodies), and after an orderly arrangement of windings a number of the tubules form slightly larger tubules (collecting tubules), so grouped together as to form striated pyramids which have their apices projecting into the pelvis of the kidney. A Malpighian body is made up of a tuft of blood-vessels, a glomerulus, surrounded by a dilated end of the tube (capsule of Bowman), so that the endothelial lining of the capillary and the epithelium of the end of the tubule are in apposition. By a process similar to filtration the excess of water in the blood passes through these walls and out of the body. There is a similar arrangement of the blood-vessels around the winding tubules, but through these the solids in solution in the blood that are of no further use to the body are taken up by the



Vertical Section of Kidney.

epithelium of the tubules and added to the watery element inside the tubes. This mixed fluid, called the urine, is then passed out into the ureter, whence it is conveyed to the bladder and stored until passed. The ureters are about 16 inches long, with the diameter of a goose-quill; they are lined by a mucous membrane, outside of which there are thin muscular and fibrous layers of tissue.

Urine.—The urine is an amber or yellowish fluid containing about 95 per cent of water, having a specific gravity of 1.018 to 1.025, an acid reaction, and rather characteristic ammoniacal odor. The inorganic solids held in solution are the chlorides, phosphates, and sulphates of sodium, magnesium, potassium, calcium, and iron. More important than these is a group of substances elaborated in the body during metabolism (q.v.), some of which may act as poisons if not properly discharged; the principal ones being urea, uric acid, creatinine, hippuric acid, and the xanthine bases. That of most importance is urea, which should in normal

adults be excreted to the amount of 500 grains daily. In kidney disease the deficiency of this substance is taken as an index of the organ's impairment.

Visible Abnormalities of the Urine.—While the average amount of urine passed by a healthy adult in 24 hours is 50 ounces (3 pints), there are constant variations from this rule, depending on the amount of water ingested and the amount lost through the skin and bowels: so also do the amount of solids vary with the diet and amount of exertion. White cloudiness of the urine may be caused by the presence of pus, phosphates, mucus, or bacterial growths. Reddish or "brick-dust" deposit is caused by an excess of urates, a condition ordinarily of no importance and never an indication of kidney disease. There is apt to be a diminution of the amount of urine in nephritis, and a great increase in diabetes.

Albumen in the urine is the serum albumen of the blood. In health the kidneys may allow the passage of faint traces of this substance, but the presence of amounts large enough to be discovered by the "heat and nitric acid" test usually indicates some abnormality of the epithelium of the tubules—congestion of these organs, inflammation of the ureter, bladder, or urethra, or an admixture of blood with the urine. Albumen may appear in the urine after severe exertion without apparent congestion of the kidneys. Certain individuals go on for years showing albumen in the urine at certain times of the day and never develop any further evidence of Bright's disease. In some persons certain articles of food, particularly those rich in albumen, cause a temporary albuminuria. Although these forms are called "functional," there is always a possibility that they may indicate some slight kidney impairment, and it is the custom of the insurance companies to refuse applicants with albuminous urine.

Urinary casts are tiny cylinders or plugs formed in the uriniferous tubules under abnormal conditions. They are formed of coagulated albumen, blood and epithelial cells, granular matter the result of epithelial cell degeneration, and so-called waxy matter. The clear "hyaline casts" may sometimes be found in small numbers in the urine from normal kidneys, but the constant presence of casts indicates a disease of the kidneys. These bodies are entirely invisible to the naked eye.

Uræmia.—This term denotes a group of symptoms that may appear in the course of diseases of the kidneys and during pregnancy. (See PUERPERAL ECLAMPSIA.) Some toxic substance is held in the blood and causes one or more of such symptoms, which may not be characteristic of uræmia but to which, because of the general complex of symptoms and the known condition of the urine, the term uræmic is applied. The various symptoms which it is customary to include in the category are headache and sleeplessness, hemiplegia and aphasia, general convulsions and spasms of groups of muscles, blindness, delirium and coma, vomiting, dyspnoea, and increased arterial tension. This last condition is due to spasm of the smaller arteries and to hypertrophy of the heart.

Diseases of the Kidneys.—Acute congestion may result from sudden obstruction of the

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veins, certain irritant poisons, exposure to cold, severe surgical operations, overexertion, or from the infectious diseases. Besides the changes seen in the urine, albuminuria and casts, if the congestion be severe there may be fever, abdominal pain, nausea and vomiting, and partial or complete suppression of urine. The treatment consists in the removal of the cause and the relief of congestion by the hot pack over the lower half of the body. In its severe forms the conditions may be fatal.

Chronic Congestion.—This condition results from obstruction to the venous outflow, as seen in disease of the lungs, heart, and liver, and from the pressure of tumors: it leads to actual change of structure.

Acute Nephritis, Acute Bright's Disease.—This is an inflammation of the vital part of the kidney structure, the secreting membrane of the uriniferous tubules and of the structures around them. In such an inflammation there is congestion of the whole organ, degeneration of the epithelial lining of the tubes, exudation of serum from the blood-vessels into the tubes, and consequent disturbance of the function of the organ. The most common causes of this condition are exposure to cold and wet, the poisons of scarlet fever, pregnancy, etc., certain causes being undiscoverable. The condition may also be due to other infectious diseases, to the ingestion of poisons, or to the presence of large burns of the body surface.

Some cases are so mild that the kidneys are not suspected, the patient having a slight fever, headache, loss of appetite, and general malaise. The ordinary cases show considerable diminution of urine, which is loaded with albumen and casts; there is considerable fever; nausea and vomiting are usual; and these are accompanied by more or less of dropsy, headache, and the other manifestations referred to under the name of uræmia, and by a rapidly developing waxy pallor. These various symptoms are not constant, but the picture is sufficient when the condition of the urine is investigated. As a rule, when this condition lasts only a few weeks these cases recover completely, and the kidneys are as good as before, but the cases of longer duration and of great severity may be fatal, or may leave permanent changes in the organ. This last effect is particularly liable to follow when nephritis begins late in the course of scarlet fever, because of the permanent changes of structure induced by some particular poison generated at that time.

The treatment of these conditions consists in absolute rest, diet of the simplest sort, preferably milk, opening of the various emunctories (the bowels and skin), and attending to such symptoms as threaten the life of the patient.

Chronic Bright's, Chronic Nephritis.—This disorder is characterized by a permanent change in the tissue of the kidney, which may follow acute inflammation, or may come on insidiously as a result of poisoning by alcohol, of syphilis, of prolonged nervous strain, with consequent disturbance of digestion and metabolism, of suppurative inflammations in other parts of the body, and of many undiscoverable causes. The changes in the kidneys consist in growth of

connective tissue around the glomeruli and tubules, more or less degeneration of the epithelium lining the tubes, and arteritis. The disease may be very insidious in development, albumen and casts being discovered on routine examination of the urine. Loss of nutrition may be noticed, or a disturbance of the gastro-intestinal tract may first call attention to the disease. The urine may be increased in amount or diminished, but as the disease progresses the specific gravity grows less from the decrease of urea. Dropsy appears around the ankles and spreads usually as the disease advances. Anæmia is fairly constant, but not severe. Sooner or later that general condition of poisoning known as uræmia is apt to develop because of the inability of the kidneys to excrete the toxic substances. Some cases suddenly develop one or more of the various symptoms, either dyspncea, dropsy, failure of the hearts' action, coma, convulsions, or hemiplegia, without the nephritis having occasioned distinct symptoms previously.

Prognosis in Chronic Nephritis.—The prognosis is not necessarily bad, although as a rule the disease progresses and causes the death of the patient. Intercurrent diseases throw extra strain on the kidneys, and may hasten a fatal termination. Many cases live for years in comparative health, and are carried off by another affection. The actual prognosis of a case is determined by the work the kidneys are able to do on a known diet and under stated conditions of work. This is best determined by an estimation of the excretion of urea in a 24-hour collection of urine.

Treatment.—No treatment of the disease, so far as cure is concerned, is possible, but the progress of the affection can be stayed and the patient kept in comparative good health by careful attention to mode of life, diet, and regulation of the bodily functions. At the time of the more acute exacerbations symptoms are relieved as they arise, and the skin and bowels are called upon to assist the kidneys in the work of excretion by diaphoresis (by the hot pack) and catharsis. When the output of urine becomes small, some benefit may result from the administration of diuretics. For the disturbance of the circulation arterial dilators and cardiac stimulants are employed, and sometimes bloodletting, with the greatest benefits.

Renal Calculi or Kidney-Stones.—See CALCULUS.

Tuberculosis of the Kidney.—This malady occurs in the form of tiny miliary tubercles scattered through the kidney, usually as a part of a general tuberculosis, and in the form of a tubercular pyonephrosis due to extension from the bladder; more rarely the process may be primary in the kidney and then extend to the bladder. The symptoms are frequent micturition, pyuria, hematuria, and occasionally the presence of a tumor. The diagnosis is difficult unless there be tuberculosis of the bladder, testes, or seminal vesicles. Although the prognosis is always grave, cases have recovered where the kidney has been inspected but not removed. Nephrectomy is not performed unless the other kidney can be proven sound.

Injuries of the Kidney.—Severe contusions of the abdomen or loins may cause laceration of the kidney substance and the capsule, or the

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kidney may be perforated by stab or gunshot wounds. Slight contusions cause pain and transient hematuria, but the more severe contusions and wounds allow the urine to flow out into the surrounding tissue, sometimes with inflammation following. The wound may require sutures, or the kidney may have to be removed.

Suppuration in and around the Kidney.—This condition is due to the infection of the part with micro-organisms, which may reach the part in three ways—through the blood, from the bladder, and through perforating wounds. It is now commonly noticed that persons in health may pass bacteria through their kidneys without resulting suppuration; and it seems that some injury must take place to allow them to grow there and cause actual damage. Such damage may be made by calculi or contusions. Pylitis is an inflammation of the pelvis of the kidney, and this part is first involved when the inflammation travels up from the bladder. Pyelonephritis is an inflammation of both pelvis and kidney structure. Pyonephrosis is the name used to describe the condition of dilatation of the pelvis and the kidneys with pus: the organ may be entirely destroyed. Perinephritis is an inflammation of the cellular tissue and fat around the kidney. In pyæmia there may be many small abscesses in the kidney substance.

The symptoms of these various forms depend on the severity and site of the inflammation: there are the changes in the urine (the presence of pus, blood, and epithelium from the various parts), the local signs (pain, and possibly swelling), and the general signs of poisoning (fever, rigors, septic look, nausea, vomiting, etc.). An abscess in the kidney may burrow through to the surface; it may drain sufficiently through the normal channels and become chronic; or the patient may die of acute sepsis.

In the treatment of the milder forms it may be sufficient to remove the cause; the bladder may be cleansed by irrigation; or if a penetrating wound be the cause it may be enlarged and cleansed. If there be a perinephritis or a severe pyelonephritis, the abscess-cavity must be drained. The kidney is removed (nephrectomy) if destruction has gone too far.

Movable or Floating Kidneys.—By this phrase is meant a condition in which the kidneys leave their fatty bed and travel downward or otherwise through the abdomen. In the milder grades of this condition the kidney is displaced downward during inspiration, but in the more severe grades one or both are constantly low, even down to the pelvis. No symptoms whatever may arise from this condition; but on the other hand the dragging on the vessels and nerves may give rise to pain in the back and sides, minor disturbances of digestion, or nausea and vomiting. The nervous system is so deranged that it is common to have most confusing symptoms. Occasionally the ureter becomes twisted and dams back the urine, causing marked distention of the pelvis of that organ, a condition called hydronephrosis. When such an obstruction persists, the kidney structure is gradually thinned until its function is lost. It is customary to have the sufferer from a

floating kidney wear a support around the abdomen; at times the operation of fixation of the kidney in its normal place may be advisable.

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Kieffer, kē'fer, **Henry Martyn**, American German Reformed clergyman and author: b. Mifflinburg, Pa., 5 Oct. 1845. He was graduated from Franklin and Marshall College, Lancaster, Pa., 1870, and from the Theological Seminary there in 1873. Enlisting at 16 as a drummer in a Pennsylvania regiment he served three years, his experiences in that capacity appearing in his popular 'Recollections of a Drummer Boy' (1883). He was pastor of a German Reformed Church at Norristown, Pa., 1873-84 and has held a similar pastorate at Easton, Pa., from the date last named. His 'College Chapel Sermons' was issued in 1891.

Kieft, kēft, **Willem**, Dutch administrator in America: b. Holland about 1600; d. off the Welsh coast 1647. He came as the fifth governor of New Netherlands, and arrived in the colony 28 March 1638. He was greedy, choleric, and tyrannous; began his administration by concentrating the executive power; and was soon involved in troubles with the Indians. In 1640 he despatched a force to murder the Raritan tribe. He was not wholly successful; the act was avenged, and when in 1643 he arranged for the destruction of the River tribe, which had sought the protection of the colony against the Mohawks, he deemed it wise to obtain sanction for the proceeding through the signatures of three citizens. A desolating war ensued, almost to the extinction of the colony. Public sentiment was strong against him, and he finally conceded the selection of a "Council of Twelve," who stood for the beginning of representative government in New Netherlands, but practically were figure-heads quite disregarded by the governor. The Puritans at the east and the Swedes at the west were making encroachments upon Dutch territory, and Kieft was finally recalled and succeeded by Peter Stuyvesant. On 16 Aug. 1647 he sailed for Holland with his enemy, Dominie Bogardus, who had denounced his tyranny, and whose services he had revengefully disturbed by having soldiers make noises under the meeting-house windows. The vessel was wrecked on the coast of Wales, and Kieft, Bogardus, and nearly all the rest on board were drowned. Kieft rebuilt Fort Amsterdam, improved the appearance of the settlement, and effected several administrative reforms.

Kiel, kēl, town of Prussia, in Holstein, situated on a deep bay of the Baltic, which presents all the appearance of a lake, and has finely wooded banks, 54 miles north by east from Hamburg, with which it is connected by railway. It was formerly the place of meeting for the Schleswig and Holstein states, and the seat of a superior appeal court for the duchies. It possesses a university, founded in 1665, with an attendance of about 900 students, a library of 200,000 volumes, museums for antiquities and ethnology, and a zoological institute. Kiel is admirably situated for trade, the whole bay on which it stands forming a safe roadstead, and the town being provided with spacious quays. Since the construction of the railway connecting it with Hamburg it has entered into formidable com-

K'ien-lung — Kilian

petition with Lübeck, and as a fortified naval port of Germany, and the station of the greater part of the imperial fleet, is rapidly rising in importance. The Kaiser-Wilhelm Ship Canal from the mouth of the Elbe joins Kiel Bay at Holtenau, somewhat north of Kiel proper. Kiel has works for sugar, soap, machinery; woolen factories, iron foundries, tan-works, tobacco works, ship-building yards, etc. Pop. (1890), 69,172; (1900), 121,824.

K'ien-Lung, kē-ĕn-loong', emperor of China: b. 1710; d. Peking 7 Feb. 1799. He succeeded his father, Yung-Ching, in 1735. He favored the Christian religion in private, but in 1753 interdicted its exercise by a formal order; and the missionaries were, in consequence, obliged to proceed with great caution, although several of them were in the emperor's service, and treated with great respect as men of science and learning. On the suppression of the Jesuits in 1774 China was less visited by scientific persons than formerly, which induced K'ien-Lung to send to Canton and invite artists and learned men of all the European nations, and particularly astronomers. Resolving to immortalize the remembrance of his victories by the graver, he engaged French artists to copy some Chinese paintings in which they were represented; but Louis XV. had them engraved for him at his own expense. The larger Chinese collection on agriculture contains several poems of this monarch on rural occupations and incidents; and he established a library of 600,000 volumes, containing copies of all the most interesting works in China. In 1795 he abdicated in favor of his son.

Kieserite, kē-zér-it, a hydrated magnesium sulphate found at Stassfurt, Germany, and elsewhere, and employed as a source of epsom salts and in the manufacture of manures. Mixed with quicklime and water it hardens into a mass which, after heating, pulverizing, and again mixing with water, becomes of a marble-like consistency, and may be made into ornamental articles, etc.

Kiev, kē'ev, or **Kief**, a government of Russia; length, 210 miles; average breadth, about 170 miles; area, 19,691 square miles. The surface is in general flat or undulating. The Dnieper and its affluent the Pripet are the only navigable streams. There are no lakes of any extent. The climate is remarkably mild and dry. The rivers freeze in December, and are again open in February. In summer the heat is so great and the quantity of rain so small that the channels of many streams become dry. Large crops of all kinds of grain are raised, and much attention is paid, especially in the south, both to the rearing of cattle and the dairy. Sugar, tobacco, spirits, and beer are manufactured, and there is a large export of grain, cattle, honey, wax, and tobacco. Pop. (1897) 3,576,125.

Kilauea, kē-low-ă'a, an active volcano in Hawaii. It has an oval crater, 9 miles in circumference, with a lake of red and boiling lava at the bottom over 1,000 feet below the crater's mouth. The volcano lies 10 miles from the sea, and 30 miles from Hilo, on the eastern slope of Mauna Loa, 4,000 feet above the sea. Kilauea crater forms a great cavity on the side of the mountain, 3 miles long, 2 miles wide and 800 feet deep. At the southwestern end is a small

lake of boiling lava called Halemanman, or House of Everlasting Fire. Great eruptions occurred here in 1789, 1823, 1832, 1840, and 1868.

Kilbourne, kil'bérn, James, American pioneer: b. New Britain, Conn., 19 Oct. 1770; d. Worthington, Ohio, 9 April 1850. He was successively employed as an apprentice, clerk, merchant, and manufacturer, and having secured a competence, presented himself as a candidate for orders in the Protestant Episcopal Church, and was ordained about 1800. In 1801-2 he organized the Scioto Company, under whose auspices a colony of about 100 persons, under the lead of Kilbourne, was in 1803 established in what is now the township of Worthington, Ohio. Having organized here the Episcopal parish of St. John's, as well as others in the neighborhood, and procured the establishment of a western diocese by the general convention of the Protestant Episcopal Church, he retired from the ministry in 1804, and was soon after appointed a civil magistrate, an officer of militia, frontier, and surveyor of a large portion of the public lands. In 1812 he was one of the commissioners to settle the boundary between the public lands and the great Virginia reservation, and also commissioned as a colonel in the frontier regiment; and in the succeeding year he entered Congress, of which he remained a member until 1817. He was the first to propose donations of lands to actual settlers in the northwest territory, and afterward served for some years in the Ohio legislature.

Kildeer. See **KILLDEE**, or **KILLDEER**.

Kilham, kil'am, Alexander, founder of the Kilhamites or New Connection Methodists: b. Epworth, Lincolnshire, 10 July 1762; d. Nottingham 20 Dec. 1798. He professed conversion at 18, became a preacher in 1783 and two years later was enrolled by Wesley as a regular itinerant. He was strongly in favor of complete separation from the Established Church, a step to which Wesley had always been opposed. On the death of the latter this subject came under discussion. He at once urged separation and sought moreover for the distribution of administrative power between the ministry and the lay members. For several offensive passages in his 'Progress of Liberty' (1795) the pamphlet in which these views were expounded, he was tried at a conference held in 1796 and expelled from the denomination, upon which he immediately organized the "New Connection Methodists, or Kilhamites."

Kilian, or **Kuln**, Saint, the apostle of Franconia. He was of noble Scottish extraction and had entered a monastery in Ireland when hearing of the spiritual destitution of German Franconia, he asked and received from the pope a commission to preach the Gospel to the German idolators, and with Colman his priest, and Totnan his deacon was instrumental in converting great numbers at Würzburg, and among them Duke Gosbert. On being rebuked by Kilian for marrying Geilana, his brother's widow, Duke Gosbert promised to put her away, and hearing this, Geilana caused the three missionaries to be secretly assassinated (690) without her husband's knowledge. Kilian is honored as the first bishop of Würzburg, and his festival is 8 July.

KILIMANJARO — KILLIFISH

Kilimanjaro, kil-ē-män-jä'rō (the Great Mountain), a double-peaked, snow-clad mountain of Africa, in German East Africa, about 100 miles inland from the port of Mombasa. The highest peak, estimated at 19,270 feet, is the highest known in the African continent.

Killarney, ki-lär'ni, market town in Ireland, in the county of Kerry, on the Great Southern and Western railway. In summer, Killarney is thronged with visitors to the lakes and the delightful scenery in the neighborhood. Fancy articles of wood, particularly of arbutus, which attains to great perfection in the environs, are made to a considerable extent, and are in great request by tourists. Pop. (1900) 5,500.

Killarney, Lakes of, three connected bodies of water, the lowermost of which is within $1\frac{1}{2}$ miles of the town of Killarney, Ireland. These famous lakes are situated in a basin in the midst of the mountains of Kerry, some of which rise abruptly from the water's edge densely clothed with trees from base to summit. Between the lower and the middle lakes is the fine ruin of Muckross Abbey.

Kill'dee, or Killdeer, the most common and best-known species of American plover (*Ægialitis vocifera*). It is found throughout temperate North America, especially in the western United States, breeding northward to Newfoundland and in winter migrating to South and Central America. It is nine or ten inches long and the sexes are similarly colored—brown above with a chestnut tinge on the rump, around the neck is a white ring bounded in front by a complete, and behind by an incomplete black ring; the lower parts are white and there is a white stripe through the eye; the wing-quills and tail are variegated black and white. The killdeer is distinctively a bird of the interior, spreading over the prairie lands and fields, and frequenting the seashore chiefly during the winter. During the summer it is usually found in pairs, breeding in corn and hay fields or along water courses. The four, clay-colored, spotted, pyriform eggs are deposited in a slight depression in the ground. Though always noisy birds, the cry or whistle, from which their name is derived, is heard in its perfection when the nest is approached, and the frightened hen endeavors by various devices to lead the intruder away. Like that of other plovers, the food is chiefly of an animal nature. In the late summer and early autumn the killdeer is sought by gunners, but much less so than related migratory species of the same genus. Consult: Baird, Brewer and Ridgeway, 'Water-birds of North America'; and Elliot, 'North American Shore Birds.'

Killebrew, kil'i-broo, Joseph Buckner, American railway official: b. Montgomery County, Tenn., 29 May 1831. He was graduated from the University of North Carolina, was Tennessee commissioner of agriculture and mining in 1871-81, acting superintendent of public instruction there in 1871-3, and in 1880 was appointed by Gen. F. A. Walker special expert for the 10th census on the culture of tobacco in the United States, his report (1881) being an acknowledged authority. In 1893 he became a railway official in the South. He was appointed editor-in-chief of the 'Rural Sun,' and published 'The Resources of Tennessee' (with J. M. Saf-

ford, 1874-5); 'Geology of Tennessee' (with Safford, 1876); 'Tobacco Leaf' (with H. Myrick, 1897); and other works.

Killer, a kind of whale, or large porpoise, also called orca or grampus, of the family *Dolphinidæ*, and constituting the genus *Orcinus*. It reaches a length of about 25 feet. The head is rounded and the lower jaw is a little shorter than the upper. The dorsal fin is extraordinarily high in the adult males, like a broadsword, nearly vertical and about six feet in length from base to tip; in the female it is prominent but much lower. The pectoral fins are large, broad, and rounded, and the flukes, or tail-fin, also broad and thick. The color is peculiar, being black above and on the fins, and white below; the margins of the two colors sharply defined. The white of the belly extends forward to the end of the lower jaw, and upward on each side where it forms a large, oblong, white area. Above and somewhat behind the eye is a conspicuous oblong, white spot. In the young the white areas are tinged with yellow. The upper and lower jaws are armed with thick, powerful, somewhat curved teeth, numbering in all from 40 to 56.

The killer is the largest and most powerful representative of the dolphin family. It hunts in packs and is rapacious and exceedingly voracious. Unlike all other cetaceans it feeds upon warm-blooded aquatic animals, and chiefly on young seals, porpoises and whales. It attacks the larger whales without hesitation, biting them on the lips and throat, sometimes in order to force them to surrender their young, which are torn to pieces and devoured. In one instance the stomach of a killer was found to contain the bodies of thirteen porpoises and fourteen seals. The best known species (*Orcinus orca*) inhabits all seas. A second species is found in the South Pacific. Others have been described, but their validity is doubtful.

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Killiecrankie, kil-i-kräng'ki, a pass of Scotland, in the Grampians of northern Perthshire, on the Highland Railway, three miles southeast of Blair-Athole. A viaduct of ten arches carries the railway over the pass. Here Claverhouse, Viscount Dundee, defeated the forces of William III. under Mackay on 7 July 1689, but was killed in the moment of victory.

Killifish, one of a group of small fishes of the family *Cyprinodontidæ*. They have broad, depressed, scaly heads, large cycloid scales, no lateral line, small very protractile mouths with several rows of pointed teeth, and a well-developed air-bladder which possesses somewhat of a pulmonary function. The common killifish, mud-fish, or mummichog (*Fundulus heteroclitus*) seldom exceeds three inches in length, and is exceedingly abundant in shallow waters along the shores of bays and estuaries, in brackish pools, and tidal rivers from Maine to Mexico. It is extremely hardy and is important economically as food for larger fishes. The sexes differ in color. The large killifish (*F. majalis*) reaches a length of six inches, and is found in shallow salt and brackish bays from Florida to Cape Cod. The males have transverse and the females longitudinal black bars. The species of *Fundulus* are oviparous, but some

KILLINGLY — KIMBALL

genera of the family are viviparous and strongly dimorphic, sexually.

Killingly, *kil'ing-li*, Conn., town, including several villages in Windham County, on the Quinebang and Five Mile rivers, 25 miles northeast of Norwich; on the New England railroad. It has the Danielson Public Library, Danielson High School, churches and town-hall, and manufactures of cotton and woolen goods, boots and shoes, etc. It was settled in 1693, and until 1708 was known as Aspinock. Pop. (1890) 7,027; (1900) 6,835.

Killington (*kil'ing-tōn*) **Peak**, an elevation of the Green Mountains, in the State of Vermont; about 10 miles southeast of Rutland. It is 4,241 feet high, and the view from its summit is most beautiful; a large number of pretty villages and charming valley may be seen on a clear day.

Kiln Pottery. After centuries of gradual development kilns as used in the clay industries have become fixed, so far as may be, in three general types, up-draft, down-draft and muffle kilns. The last named stands alone as its distinctive feature lies not in the method of firing or the direction of the draft but in the fact that the kiln consists of a single laboratory closed to the direct entrance of flame and heated by radiation through the walls. This type of kiln is used in all cases where it is necessary that the contained wares should be protected from dust and smoke but where it is not convenient to enclose them in saggers. Large ware such as porcelain bath-tubs and sinks, heavy pieces of terra-cotta, etc., cannot be set in saggers as pottery is on account of weight and size. They are therefore burned in a muffle kiln being set directly upon the brick floor. Muffle kilns are also used for burning painted wares. These are smaller than the kilns for heavy goods and are burned to a much lower temperature. Such kilns can be set, burned, cooled and drawn in 24 hours, while the large muffles cannot be turned in less than 10 days.

General kilns for pottery burning are of the open type. The wares are enclosed in saggers which are set over one another in tiers (bung). Saggers are cases made of refractory clay and suited as to size to the wares they are to contain. The flames and kiln gases pass freely round the saggers and the whole chamber is uniformly heated.

The usual form of kiln is cylindrical with a slightly domed crown. Outside this is the "hovel" or conical top familiar to the inhabitants of pottery towns. The hovel serves the purpose of a chimney and collects the smoke from a number of apertures in the kiln crown. The fire mouths range in number from six to ten according to the size of the kiln. In the up-draft kiln the gases simply pass up between the bungs of saggers and find a free vent at the top. In the down-draft type the top of the crown is closed and the gases after passing up the walls and under the crown are led down a centre stack and up again through flues arranged for the purpose. The structure of the down-draft kiln is more complicated than the up-draft, but a considerable economy of fuel is effected. The kiln also cools more rapidly.

Kilns for burning brick follow the same general lines but vary in form. For this purpose

the square kiln is among the most popular, being usually operated on the down-draft principle.

Many plans have been devised for the perfect utilization of heat, but none that is entirely satisfactory. One of the best is that of the continuous kiln. This has been applied in Germany to the burning of porcelain, but nothing better than brick has been entrusted to it in America. The continuous kiln is a long low tunnel built in the form of a parallelogram with rounded ends. This is divided into as many chambers as may be necessary, each chamber having an entrance at each side and two fire mouths. Paper partitions are used in order to secure the correct movement of the draft, and as each successive chamber is filled with ware and the proper dampers opened the heat from the burning chambers is drawn through the unburned brick bringing them up to a high temperature without any additional fuel. Meanwhile the chambers in which the firing has been completed are beginning to cool and so the work goes on continuously. The economy of the method is very great, but a considerable output is necessary in order to avoid stoppage. Kilns are, for the most part, burned with coal, both hard and soft coals being used. Those in the gas belt are successfully burned with natural gas and in some places oil is used. The temperatures at which different wares are burned are about as follows:

Roofing tile and paving brick.....	1030°—1070°C
Common brick and drain tile.....	1090°—1170°C
Faience art pottery — glaze.....	1150°C
Faience art pottery — body.....	1230°C
Sewer-pipe and stoneware	1250°—1290°C
Earthenware dishes	1290°—1310°C
Hotel china	1330°C
Bone china	1330°C
Hard porcelain	1390°—1410°C

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Kil'o. See METRIC SYSTEM.

Kil'ogramme, or **Kilogram**, a French measure of weight = 1,000 grammes. See METRIC SYSTEM.

Kil'oliter, *kil'ō-lē-tér*, or **Kilotitre**, a French measure of capacity for fluids, 1,000 liters. See METRIC SYSTEM.

Kil'owatt. See UNITS; WATT.

Kilpat'rick, *Hugh Judson*, American soldier: b. Deckertown, N. J., 14 Jan. 1836; d. Valparaiso, Chile, 4 Dec. 1881. He was graduated at West Point in 1861, and in the autumn of that year became a lieutenant-colonel of cavalry. He was appointed a brigadier-general of volunteers in May 1863, and in the following March was active in a raid to Richmond for the release of Federal prisoners. He commanded the cavalry of Sherman's army in its march from Atlanta to Savannah, in 1864, and in June 1865 was promoted major-general of volunteers. After the War he was prominent as a lecturer and a Republican political speaker. He was minister to Chile from 1865 to 1870, and was reappointed in 1881. In 1887 his remains were removed from Chile and interred at West Point. Consult: Moore, 'Kilpatrick and our Cavalry' (1865).

Kim'ball, *Hannah Parker*, American poet: b. Boston, Mass., 25 April 1861. She has published: 'Soul and Sense' (1890); 'Victory and Other Verses' (1897).

KIMBALL — KIMCHI

Kimball, Harriet McEwen, American religious poet: b. Portsmouth, N. H. November 1834. Although she has written much verse of a secular nature, it is as a religious poet that she is best known, and several of her lyrics have found an honored place in hymnals. She was the principal founder of the cottage hospital in her native city. Her published works include: 'Hymns'; 'Swallow Flights'; 'The Blessed Company of All Faithful People'; 'Complete Poems' (1889).

Kimball, Heber Chase, American Mormon leader: b. Sheldon, Franklin County, Vt., 14 June 1801; d. Salt Lake City, Utah, 22 June 1868. In 1832 he was baptized into the Church of Latter-Day Saints, in the same year was ordained an elder of the church by Joseph Smith, and in 1835 became one of the 12 Mormon apostles. In 1838 with Brigham Young he led the Mormons from Missouri into Illinois, where they finally settled at Nauvoo, and in 1847 was a pioneer in the exodus to the valley of Great Salt Lake. He was successively chief priest of the order of Melchizidek (1846), a councillor to Young (1847), and chief justice and lieutenant-governor of Deseret.

Kimball, Richard Burleigh, American author: b. Plainfield, N. H., 11 Oct. 1816; d. New York 28 Dec. 1892. He was graduated at Dartmouth College in 1834 and later admitted to the bar; practised his profession at first in Waterford, N. Y., and afterward in New York. He founded the town of Kimball, Texas, and constructed the first railroad in that State, extending from Galveston to and beyond Houston. His publications include: 'Letters from England' (1842); 'Cuba and the Cubans' (1850); 'Saint Leger' (1850); 'Romance of Student Life Abroad' (1853); 'Under-Currents of Wall Street' (1862); 'Henry Powers, Banker' (1868); 'Today in New York' (1870); 'Stories of Exceptional Life' (1887).

Kimball, Sumner Increase, organizer and superintendent of the United States Life Saving Service: b. Lebanon, York County, Maine, 2 Sept. 1834. He was graduated from Bowdoin in 1855; studied law, and was admitted to the bar in 1858. In 1859 he served in the State legislature, and was a member of the committee on judiciary. In 1862 he became a clerk in the second auditor's office in the Treasury Department at Washington, and in 1871 was made chief of the revenue marine service. In that position he had occasion to investigate the condition of the government stations on the New Jersey and Long Island coast where surf boats and other apparatus were stored under the charge of a keeper for use in case of shipwreck; he found the property badly cared for, and the service inefficient. Obtaining an appropriation from Congress he entirely reorganized the service, and so successfully that it was soon extended to Cape Cod and other points on the Atlantic coast. In 1878 the life saving service was organized as a separate bureau and was extended to the Pacific coast and the Great Lakes. He was made the head of the bureau and has introduced many improved methods, including the patrol system, and telephonic connection between adjacent stations; he also obtained the passage of the law, to the effect that inspectors, keepers and crews in the service

should be appointed on a strictly non-partisan basis "with reference solely to their fitness." He has also been acting register, acting comptroller, and acting solicitor of the Treasury; and in 1889 he was the United States delegate to the International Marine Conference. He has written 'Organization and Methods of the United States Life Saving Service' (1880), the most complete monograph on the subject.

Kimberley, kim'bér-li, Lewis Ashfield, American rear-admiral: b. Troy, N. Y., 2 April 1830. He was appointed to the navy in 1846 and was graduated from the Naval Academy in 1852. In the Civil War as executive officer of the Hartford, Farragut's flagship, he took part in the contests at Port Hudson, Grand Gulf, Warrington, and Mobile Bay; and in 1871 accompanied the United States expedition to Korea. In 1880-3 he commanded the navy-yard at New York, in 1884-5 was a member of the examining and retiring board, in 1885-6 was in command of the Boston navy-yard, in 1887 was promoted to rear-admiral, and in 1892 was retired.

Kimberley, Australia, a northern district of Western Australia, brought into notice by the discovery of gold fields in 1886. It contains immense tracts of splendid pasture and much land suitable for cultivation. The chief port for the district is Derby, on the Fitzroy River, near King Sound. The district, which has an area of 144,000 square miles, is divided into East and West Kimberley. It is separated from the more populous parts of the colony by a stretch of sandy desert.

Kimberley, South Africa, town of Cape Colony, the capital of Griqualand West and of the South African diamond fields, is situated at a distance of 647 miles by rail from Cape Town, and close to the western boundary of the Orange River Colony. Kimberley owes its existence and prosperity to the mining of diamonds, an industry that began in 1870. It stands on an open plain, has wide straight streets, good public and other buildings, and receives a supply of water from the Vaal, 17 miles distant. Some of the most important buildings are the High Court of Griqualand West; the public library; the Kimberley Club, rebuilt in 1895 after destruction by fire; the Masonic Temple; a municipal sanatorium; theatres; several churches and a synagogue, etc. The most important diamond mines are those called Kimberley, De Beers, Bultfontein, Du Toit's Pan, and Wesselton. During the South African war Kimberley was invested by the Boers for 123 days, from 15 Oct. 1899, till its relief by General French on 15 Feb. 1900. Diamonds to the value of over £60,000,000 have been obtained here. Pop. 28,718.

Kimchi, kim'kē, David, or Rdak (RABBI DAVID KIMCHI), Hebrew philologist: b. Narbonne 1160; d. 1240. He was the most learned member of a learned family, and maintains to-day his reputation as grammarian, lexicographer, and exegete. Besides his commentary on Genesis, Chronicles, the Prophets, and the Psalms, he wrote a grammar, 'Michlol' (Venice 1545); a Hebrew dictionary, 'Sefer Haschoraschin,' which was practically a list of roots (Naples 1490). He also wrote a tract under the title 'El Sofer,' which treated of the Massora and the Hebrew Accents and was published for the first time in 1864.

KINAH — KINDERGARTEN IN AMERICA

Kinah, ki'nä, The, a Hebrew metrical form, usually employed in dirges and songs of mourning, such as the Lamentations of Jeremiah. Each verse member is divided by a cæsura into two unequal parts, of which the first is the longer. The shorter clause simply enforces the thought expressed in the longer; as in the following example:

"He was unto me as a bear lying in wait ||
a lion in secret places."

"And thou hast removed my soul far off
from peace || I forgot prosperity."

The kinah, with its long drawn out clause, and its short abrupt closing phrase, is still employed in Oriental countries. It has the effect of a cry, followed by a sob. It seems to halt like the metre which in classic times was called the halting iambus, and it might fittingly be styled the Semitic choliambus.

Kindergarten in America. The kindergarten is a form of education for children too young to enter the regular schools. The principles and methods of the kindergarten were worked out by Friedrich Froebel (q.v.). Its ideal is to develop the child's mental and moral powers through a wise direction of the child's natural self-activity or "play." Mental development is attained through a connected series of simple objects, called "gifts," from which the children learn the facts of form, color, size, weight, measure, and general relationship; and through a series of simple occupations in plaiting, weaving, modeling, etc., in which the knowledge gained is used and the powers of observation and attention developed. Games, music and story-telling are also important parts of the work; and much emphasis is laid on the development of the social instincts and sympathies of the children.

The history of the kindergarten in America is the record of four sharply defined movements; the pioneer movement, whose point of departure was the city of Boston; the philanthropic movement, whose initial effort was made in the village of Florence, Mass., and whose greatest triumphs have been achieved in San Francisco; the national movement, which emanated from St. Louis; and the maternal movement which, radiating from Chicago, is now spreading throughout the United States. The first of these movements called public attention to the several most important aspects of the Froebelian ideal; the second demonstrated the efficiency of the new education as a redemptive force; the third is making the kindergarten an integral part of the national school system; the fourth is evolving a more enlightened and consecrated motherhood and thereby strengthening the foundations and elevating the ideals of American family life.

Pioneer Movement.—In 1840 the first kindergarten was established by Friedrich Froebel at Blankenburg, Germany. Nineteen years later Miss Elizabeth Peabody of Boston became interested in Froebel's writings. In 1867 she went to Germany to study the kindergarten system. Returning to America in 1868 she devoted the remainder of her life to the propagation of Froebel's educational principles. Through her labors parents were inspired to seek the help of the kindergarten in the education of their children; philanthropists were incited to establish charity kindergartens; the Boston school board was persuaded to open an experimental

kindergarten in one of its public schools and a periodical devoted to the elucidation and dissemination of Froebelian ideals was founded and sustained for four years. The pioneer movement, therefore, broke paths in the four directions of private, public, philanthropic and literary work. Above all through the contagious power of devout enthusiasm it created the consecrated endeavor without which the kindergarten as Froebel conceived it can have no actual embodiment.

In 1872 an independent pioneer movement was begun in New York by Miss Henrietta Haines who invited Miss Boelte to conduct a kindergarten in her school for young ladies. Miss Boelte had studied three years with Froebel's widow, had won a high reputation in Germany, and later had done efficient work in England. About a year after her arrival in America she married Prof. John Kraus and established an independent kindergarten and normal class. Her normal work still continues and she is to-day the leading representative in America of the Froebel tradition. The power of her work results from her resolute adherence to all the details of the original Froebelian method. By this unswerving conformity she has kept alive, through their practical application, ideas which are of the highest importance to the theoretic development of the kindergarten system.

Philanthropic Movement.—In 1874 Mr. S. H. Hill, of Florence, Mass., contributed funds to open the first charity kindergarten in the United States and later put in trust a sum sufficient to sustain and extend the work. Four years later a philanthropic movement was initiated in Boston by Mrs. Quincy A. Shaw, who for the ensuing 14 years supported free kindergartens for poor children, these beneficent institutions reaching at one time to 30 in number. The influence of her example has doubtless conspired with other causes to create the numerous local associations which are now rendering efficient service to the Froebelian cause in different sections of the United States. Of such philanthropic associations the wealthiest and best organized is the Golden Gate association of San Francisco. At the time of its greatest prosperity this organization supported 41 kindergartens, had given training to more than 30,000 children, and had received contributions amounting to \$500,000; unfortunately the financial depression of 1893 reduced its subscription list, and the number of its kindergartens dwindled to 23; it conducts a training school for kindergartners. Other associations deserving special mention are the New York Kindergarten association, whose aim is to provide for the children against whom the overcrowded public schools still close their doors; the Brooklyn association, under whose auspices many mothers' meetings are conducted; the Pittsburg and Allegheny association; the Cincinnati association; the Free Kindergarten association of Chicago, which has a flourishing normal school; the Chicago Froebel association, which organized the first charity kindergarten in that city; the Louisville association, which has parents, nurses, Sunday school, boarding and normal departments. Kindergarten work has also been taken up by many churches, kindergarten methods being introduced in the Sunday school, and day kindergartens established under church

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management; All Souls' church of New York city was the first to open a day kindergarten. The total number of private kindergartens in the United States in 1901 was 2,996, with 93,737 children enrolled.

National Movement.—Valuable as is the work accomplished by private kindergartens and kindergarten associations, it is necessarily a restricted work; and had the Froebelian movement developed only upon these lines the kindergarten must have remained forever the privilege of the wealthy few, and the occasional gift of charity to the abject poor. The public kindergarten opened in Boston, though carried on for several years, was finally given up upon the plea that the city could not afford to appropriate funds to extend the system, and a second public kindergarten, which was opened in Brighton, Mass., in January 1873, was abolished when Brighton was annexed to Boston in 1874. Meantime, however, Hon. William T. Harris, who was then superintendent of schools in St. Louis, had called attention to the kindergarten and suggested that experiments be made with a view to introducing into the public school such features of the system as might prove helpful in the education of children between the ages of four and six. The outcome of this suggestion was the opening of an experimental kindergarten in the fall of 1873. The work was approved by the school board; new kindergartens were opened as rapidly as competent directors could be prepared to take charge of them, and when Dr. Harris resigned his position as superintendent in 1880 the St. Louis kindergartens had an enrolment of 7,828 children and the system was so firmly established that it has since that time proved itself impregnable to all attack.

The experiment in St. Louis was a crucial one, and had it failed it would have been difficult to prevail upon other cities to introduce the kindergarten into their public schools. There were many ready arguments against such an innovation: the argument from expense; the argument based on the age of kindergarten children; the argument that kindergartens would spoil the children and fill the primary grade with intractable pupils; the argument that only rarely endowed and, therefore, rarely to be found persons could successfully conduct a kindergarten. These arguments would have acquired irresistible force when confirmed by an abortive experiment. Dr. Harris steered the kindergarten cause through stormy waters to a safe harbor. He proved that the kindergarten could be made an integral part of the public school system. He reduced the annual expense to less than five dollars for each child. He called attention to the fact that the years between four and six were critical ones and that the needs of the child at this period were not provided for either by the family or the school. He convinced himself that children who had attended kindergartens conducted by competent directors did better on entering school than those who had received no such training, and the weight of his authoritative statement gave other educators faith in the possibilities of the system. Finally, he proved that with wise training young women of average ability made satisfactory kindergartners. It was impossible to go on repeating that a thing could not be done

in the face of the fact that it had been done, and with the success of the experiment in St. Louis recognition of the kindergarten as the first stage of all public education became simply a matter of time.

In a report entitled 'Early History of the Kindergarten in St. Louis' Dr. Harris reduced his argument in favor of the kindergarten to a brief statement which no one could dispute and whose force everyone could appreciate; and immediately upon the publication of his report the movement in favor of public kindergartens showed an increased momentum. In the years which have elapsed since the successful experiment in St. Louis the kindergarten has been made part of the public school system in 293 cities; the total number of public kindergartens has increased to 2,111 with 3,611 teachers and 149,710 pupils. The cities which have the most fully developed systems of public kindergartens are Boston, Chicago, St. Louis, Philadelphia, New York, Brooklyn, Newark, Milwaukee, and Los Angeles. Philadelphia, which reports 142 kindergartens, leads in number all the cities of the United States. New York follows with 135 kindergartens, St. Louis with 125, Chicago with 89 and Boston with 78. An estimate, based on the sale of kindergarten material, fixes the total number of kindergartens in New York at over 600, so that, including private work and association work, this city has presumably a more extensive provision of kindergartens than any other in the United States.

The following 10 States have the most extensive provision of kindergartens, public and private. The order of the names indicates the relative extent of the provision:

- | | |
|------------------|---------------|
| 1. New York | 6. New Jersey |
| 2. Pennsylvania | 7. California |
| 3. Massachusetts | 8. Ohio |
| 4. Illinois | 9. Wisconsin |
| 5. Michigan | 10. Missouri |

In the year 1873 the National bureau of education began collecting statistics with regard to the total number of kindergartens in the United States. The results are necessarily imperfect, but they enable us to form an approximate idea of the growth of the system. Taking public and private work together, the advance of the kindergarten is shown in the following table:

	1873	1882	1892	1902
Kindergartens	42	348	1,311	5,107
Teachers	73	814	2,535	9,926
Pupils	1,252	16,916	65,296	243,447

Results of Kindergarten Instruction.—Since the aim of the kindergarten is not instruction, but development, its results cannot be tested by examinations or expressed in statistical tables, but must be gathered from the testimony of experts who have had time and opportunity to study its influence. In other words, kindergarten children must be judged by elementary teachers and principals of schools, and unless, upon entering the primary grade, they show superiority to children coming direct from the home, the kindergarten cannot be said to have justified its adoption into our national system of education. Conversely, if the mental and moral superiority of kindergarten children prove to have converted primary teachers and school principals from enemies into warm friends of the Froebelian method, this fact should be accepted as convincing evidence of the merit of the work.

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Before presenting the testimony which has been collected, it is necessary to call attention to the fact that, in the kindergarten talking is not forbidden, but, on the contrary, children are encouraged to share with the kindergartner and with each other all their happy experience of effort and success. It is, therefore, natural that pupils promoted from the kindergarten should not at first understand the law of silence imposed by the character of the work in the elementary grades, and hence that, without any bad motive on their own part, they should prove troublesome pupils during the first weeks of school life. The failure to understand this fact has caused some unjust criticism of kindergarten children. It will, however, be apparent to all who read carefully the testimony submitted that the adjustment of the kindergarten child to the school environment is a problem which is at present rapidly progressing toward a happy solution.

The more complete the testimony offered, the more certainly should we expect to find some differences of opinion as to the characteristics of kindergarten children. In any large city there will probably be a few incompetent kindergartners and some unintelligent or reactionary primary teachers. That the kindergarten fails to command itself to teachers who are themselves mere martinets should be accounted a merit rather than a defect. The condemnation of incompetent kindergartners by wise primary teachers is a cause of rejoicing to all true friends of the Froebelian method. The influence of the kindergarten should be determined by the majority report. Variations of opinion should be explained by the occasional defect of the kindergartens and the occasional incapacity or prejudice of the judge.

The most extensive and carefully collected information comes from Boston, and consists of 163 letters from teachers of the first grade in reply to a number of questions sent out by the superintendent of schools.

Of the 163 letters those reporting that less than 10 per cent of the children attending the given primary room had received kindergarten training have been eliminated; also several letters based upon experience with children who had been only a few weeks or months in the kindergarten. The total number of letters omitted was 36. Of the remaining 127 letters 102 are favorable and 25 unfavorable to the kindergarten. Among the letters which are classed as unfavorable one only is unqualified in its disapprobation. All the others admit some distinctive merits in kindergarten children, those most frequently specified being increased power of observation and linguistic expression, greater manual skill, and more general information. The most frequent criticisms are that kindergarten children are talkative and not easily amenable to school discipline. Contrasting the 102 favorable with the 25 unfavorable letters, the first fact which thrusts itself upon the notice of the reader is that the majority of their writers seem to have had little difficulty in solving the problem of discipline. A large proportion of these letters make no direct reference to this question, while the account given of the moral characteristics of kindergarten children precludes the thought that they have been found difficult to control.

Replying to the questions with regard to the relative progress of kindergarten children and the character of their work 38 teachers report both a progress quicker in point of time and improvement in the quality of work; 13 teachers report increased rapidity without change in the character of work, and 28 improvement in the character of work without increased rapidity of progress. Thus 51 report greater rapidity, 66 improvement in quality of work, and 79 a decided gain either in speed or quality or in both. The remaining 23 teachers seem to consider that kindergarten training increases the child's general intelligence but does not noticeably affect the ordinary routine of school work.

To the disciple of Froebel the most interesting paragraphs of the Boston letters are those which answer the question, "What, if anything, have you observed as to the characteristics of kindergarten children as compared with other children?" The specific gains mentioned are clearer ideas of number, form and color; greater knowledge of and interest in nature, improved singing, better expression in reading, improved articulation, more orderly and careful arrangement of material in busy work, and greater manual skill shown especially in writing and drawing. The intellectual characteristics of kindergarten children as compared with others are said to be a greater general activity of mind, quicker comprehension, a more receptive mental attitude, greater logical power, greater concentration, more imagination, greatly increased powers of observation and expression, quicker recognition of likenesses, differences and relations, greater love for the beautiful, and visibly increased originality and creative power. Of their moral characteristics it is said that as compared with others kindergarten children are neater, cleaner, more orderly, more industrious and more persevering. They are also more self-reliant, more painstaking and more self-helpful. They are less self-conscious and more polite. They obey more quickly and are more gentle toward each other. They have a more developed spirit of helpfulness. They are more eager, alert, enthusiastic and responsive. They are interested in a wider range of subjects. They have finer sensibilities, manifest love for and confidence in their teachers, and show special interest in everything pertaining to home and family life.

In regard to the St. Louis kindergartens 13 letters, written by teachers of the first grade, reported the progress of kindergarten children in each of the several districts of the city. Two of the letters were eliminated in condensing the reports, because, while kindly in feeling, they were not precise in statement. Of the remaining 11 letters 9 reported that kindergarten children were proficient in arithmetic, and affirmed the conviction that the training of the kindergarten facilitated progress in learning to write, and was of marked value in learning to read. The other two recognized no difference in these respects between kindergarten children and children who came to school direct from the home. The unanimous verdict was that kindergarten children were superior to others in drawing. All the letters concurred likewise in the statement that kindergarten culture developed the aesthetic sense. The intellectual characteristics specified were accurate observations; correct expression; power to make numerical combina-

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tions; familiarity with geometric forms; quick recognition of magnitude and relation; a generally increased perceptive power, and signal ability in illustrating poems and stories. With regard to manners and morals 9 teachers recognized the good influence of the kindergarten. Of the remaining two one found "few causes for complaint," and the other referred merely to a possible good effect upon order and punctuality. The moral characteristics which were said to distinguish kindergarten children were order, cleanliness, courtesy, consideration, kindness, a perceptible development of the ideal of social dependence and "a love for the beautiful in character."

Dr. E. Benj. Andrews, when superintendent of schools in Chicago, wrote: "Our best first grade pupils are from the kindergarten, and the influence of kindergarten teaching is more and more felt in all the grades. Its ethical and social value is equal to its intellectual value"; and principals of schools in that city gave equally favorable testimony. Since the kindergarten system has been more highly developed in Boston, Chicago and St. Louis than in other places, testimony from these cities is of the highest importance; similar results are however, showing themselves in many smaller cities and towns.

Dangers of Kindergarten Education.—In view of the attacks so freely and insistently made upon what is called the "sentimentalism" of the kindergarten, it may be well to call attention to the fact that none of the expert witnesses whose testimony has been quoted seem to have detected its existence. Undoubtedly among kindergartners there are some sentimentalists; but that sentimentalism is inherent in the Froebelian ideal or tolerated in the best training schools for kindergartners may be unhesitatingly denied. There is greater danger of its appearance in private than in public work, because any person calling herself a kindergartner may be accepted as such by ignorant or thoughtless parents. In public kindergartens under competent supervision its persistence is impossible.

It is greatly to be desired that all cities establishing kindergartens in connection with their public schools, should insist upon having a specially qualified supervisor. Without watchful and intelligent guidance the kindergarten tends either to relapse into a mere play school or to become too closely conformed to the primary school. The ideal supervisor stands to the individual kindergartner in a relation similar to that which the latter occupies toward her children. She quickens their intellectual and moral aspiration, deepens in them the complementary impulses of self-culture and child-nurture, points out practical errors and suggests the ways and means of overcoming them. She must thoroughly understand the method of the kindergarten, its psychologic implications and its relationship to education as a whole. She must unite intellectual insight with moral earnestness and practical sagacity. Hence only the most gifted and illuminated kindergartners are adequate to the work of supervision.

Two great dangers assail the kindergarten and threaten to impede its progress toward the realization of Froebel's ideal. The first of these dangers is reversion to instinctive games and

traditional toys. In some kindergartens, children are taught to play street games, while it has recently been urged that peg boards, tops, bean bags, kites, dolls, jackstraws, hoops, spool, chalk and wire games and the whole toy world should be added to the Froebelian instrumentalities. Tendencies such as these indicate a complete failure to comprehend what Froebel has done. He recognized in traditional games the deposit of unconscious reason; preserved what was good and omitted what was crude and coarse in these products of instinct; supplied missing links and presented a series of games wherein each is related to all the others and which, by means of dramatic and graphic representation, poetry and music, win for the ideals they embody a controlling power over the imagination. In like manner, from among traditional toys he selected those which possessed most educative value, ordered them into a related series and suggested a method by which they might be consciously used to interpret the child's experiences and develop his creative power. If this transfiguration of traditional games and toys is valueless, then the kindergarten has no *raison d'être*. But if Froebel has translated the hieroglyphic of instinctive play and found means which, without detriment to the child's spontaneity, influence the growth of character and the trend of thought, then the clamor for street games and promiscuous toys is educational atavism.

The second danger which threatens the integrity of the kindergarten is the substitution of exercises which attempt to wind thought around some arbitrarily chosen centre for those Froebelian exercises whose confessed aim is to assist thought to unwind itself. Too many kindergartners have allowed themselves to be betrayed into selecting some object such as a pine tree or a potato, and making all songs, games, stories and gift exercises revolve around it. Between these so-called cores of interest and the exercises clustered around them there is no valid connection. The clustering like the subject depends wholly upon the caprice of the teacher. Could such exercises succeed in their object the pupils of different teachers would have their thoughts set to revolving around different centres and more than this around arbitrary and contingent centres. That such a procedure directly contradicts Froebel's ideal will be apparent to all who have understood his writings. That it likewise contradicts every true ideal of education will be evident to all who understand that the function of education is to substitute objective and universal for subjective and contingent associations. The discovery of related qualities in nature, the disclosure of their causes and the reduction of these causes to a system is the great work of science. The discovery of the related activities of mind and their genetic evolution is the work of psychology. The portrayal of the universal and divine man latent in each individual is the supreme achievement of literature and art. To lead pupils away from what is capricious, arbitrary and accidental, and thus capacitate them to receive and augment their scientific, æsthetic, literary and psychologic inheritance is the great duty of education. The substitution of arbitrary for necessary cores of thought wherever attempted is, therefore, the parody of education.

KINEMATICS

Normal Schools.—The future of the kindergarten in the United States is largely dependent upon the work of the normal schools for kindergartners. The friends of the system must, therefore, view with disapprobation and even with dismay the rapid multiplication of schools with low standards of admission and a low conception of the training they should give. Inexperienced students are attracted to such schools, and the result is that the whole country is flooded with so-called kindergartners who are ignorant of the first principles of true education.

In the early days of the Froebelian movement it was believed that in a single year young girls could be prepared to conduct a kindergarten. In most reputable training schools the course has now been extended to cover two years. The requirements for admission into these schools are, generally, graduation from a high school, or an education equivalent thereto. The courses of study include theory of the kindergarten gifts and occupations, study of the Mother Play, practice in songs and games, physical culture, lessons in singing, drawing, modeling and color, lectures on the art of story telling, and more or less observation of the practical work of the kindergarten. Finally, some trainers insist that their normal pupils shall not only observe but assist in actual work with the children. In addition to this specific training, the best normal schools offer courses in science, literature, psychology, and the history of education.

Besides private normal schools and training schools connected with kindergarten associations, kindergarten departments have been established in several great *quasi-public* institutions. Among the most notable of these are the kindergarten department of Pratt institute, Brooklyn, and of Teachers college, Columbia university, and of Workingman's institute, New York. A number of the public normal schools in the United States provide some kind of kindergarten training, the courses varying in length from about two years to six months. These kindergarten departments are found in the normal schools of the following States: New York, Michigan, Pennsylvania, California, Massachusetts, New Jersey, Connecticut, Wisconsin, Illinois, Colorado, Kansas, Rhode Island, Georgia, Nebraska, Ohio, Minnesota.

Kindergartners are admitted to surpass all other teachers as students of educational literature. They are also distinguishing themselves by zealous and persistent attendance upon post-graduate courses in pedagogics, science, literature, history and psychology. Through the efforts of the Chicago kindergarten college post-graduate work of a high order has become a feature of Froebelian activity in that city; in Boston, during successive winters post-graduate classes have been organized in the study of Mother Play, and the pedagogics of the kindergarten; and courses in literature and psychology have also been given. Similar work has been developed in New York, Baltimore, Washington, and other cities.

Maternal Movement.—The power of the kindergarten over the minds of its students arises from the fact that it connects the ideal of self-culture with the ideal of child-nurture. And the true woman responds with whole heart to the appeal to learn all she can, be all she can,

and devote all she is and all she knows to the service of childhood. Rooted in maternal impulses it would be strange indeed if the kindergarten did not appeal to mothers. That classes for mothers should come into existence was a predestined phase of the Froebelian movement. Whoever has studied the writings of Froebel knows that the education of mothers was one of the most important features of his endeavor. Practically, however, the work in this direction amounted to very little until a mothers' department was established in that unique institution, the Chicago kindergarten college. This institution has consciously attempted the transformation of a girls' college into a school for motherhood; while giving general culture its supreme aim is to fit women for motherhood, and it gives instruction to mothers as well as to young girls; in a single year over 700 women attended its mothers' department; recently the work of this department has been extended by holding convocations for the discussion of all phases of child-nurture. Radiating from the kindergarten college as its centre the maternal movement is spreading throughout the United States. It is the highest reach of the Froebelian ideal and means nothing less than the attempted regeneration of all human life through the regeneration of the family. In connection with this movement mothers' clubs have been formed, whose work is usually done on three main lines: (1) kindergarten classes for the children; (2) training and study classes for mothers; (3) lecture courses in literature, science, music, etc.

Froebel's supreme claim to our grateful remembrance rests upon the fact that consciously repeating the unconscious process of social evolution he set the little child in front of the great army of advancing humanity. Science affirms that the feebleness of infancy created the family and that from the family have been evolved the higher institutions. In his cry, "Come, let us live for the children," Froebel utters in articulate speech the ideal whose unconscious impulse set in motion the drama of human history. The little child was pioneer of the process which created human institutions. We must make him the pioneer of their perfection.

Bibliography.—Henry Barnard, 'Kindergarten and Child Culture'; S. E. Blow, 'Letters to a Mother'; 'Symbolic Education'; Froebel, 'Education by Development'; 'Education of Man'; 'Mottoes and Commentaries'; 'Pedagogics of the Kindergarten'; Hanschman, 'The Kindergarten System'; Elizabeth Harrison, 'Froebel's Building Gifts'; 'A Study of Child Nature'; 'Two Children of the Foothills'; J. L. Hughes, 'Froebel's Educational Laws for all Teachers'; Bertha von Marenholz-Bulno, 'Reminiscences of Froebel'; Elizabeth Peabody, 'Lectures to Kindergartners'; Emilie Poullson, 'Love and Law in Child Training'; Nora A. Smith, 'The Kindergarten in a Nutshell'; D. J. Snider, 'Commentary on Froebel's Play Songs'; 'Life of Froebel'; 'Psychology of Froebel's Play Gifts'; K. D. Wiggan and N. A. Smith, 'Kindergarten Principles and Practice.'

SUSAN E. BLOW.

Kinematics, a branch of mathematics which treats of the motions of bodies independently of the forces which produce these motions; it is usually treated of in the introductory parts

KINETIC THEORY OF GASES — KINETOGRAPH

of works on kinetics (popularly termed dynamics).

Kinet'ic Theory of Gases. On any kinetic theory the molecules of a gas are conceived to be in motion in paths long compared with their own size, the average length of path being called the "mean free path." See MATTER.

Kinetogenesis. The mechanics of evolution (q.v.). This is a term suggested by E. D. Cope, meaning development by motion, or the exercise of parts or organs, and is nearly the equivalent of use (q.v.). The examples given by Cope are the development by use of muscles of any hard parts or bone. He claims that muscular tissue is highly plastic, and since it is directly controlled by nervous or equivalent stimuli, "the effect of the latter in building structure is evident." Another example, overlooked by late students, is the beautiful study on the mechanical genesis of bone structure published by Wyman in 1857. This anatomist shows that the cancellated structure of the bone (see BONE) in the lumbar vertebrae, the thigh-bone, tibia, astragalus, and os calcis of man is peculiar to him, and has "a definite relation to the erect position which is naturally assumed by man alone."

The fibres or cancelli of such bones as assist in supporting the weight "are arranged either in the direction of that weight, or in such a manner as to support and brace those cancelli which are in that direction. In a mechanical point of view they may be regarded in nearly all these bones as a series of studs and braces." Wyman dealing with the individual bones shows in what direction force or weight is applied to them, and the corresponding direction the cancelli assume. On the lumbar vertebrae there is vertical pressure, and the principal bone fibres within are also vertical. On the neck of the thigh bone the weight of the body is applied obliquely to the end of an arm, "within it there is a combination of fibres giving strength with lightness, which forms a frame mechanically adapted for resisting the weight which rests upon it," and so with the astragalus. "A certain direction of fibres in all these instances co-exists with a certain direction, or certain directions, of the transmission of pressure. From this constant association of structures and function the inference seems unavoidable, that they are means and ends."

Comparing the bones in question with those of the gorilla and chimpanzee, only "slight traces of the trusswork described in man exist." As they practically exist in man alone, Wyman maintains that "they relate to the kind of locomotion which he alone of the whole animal series can be said to possess, namely, that of walking erect, and which requires in the passive and resisting organs subservient to it, in order that it may be effected with ease and grace, a nice combination of lightness with strength in the materials. His attitude more than any other, in consequence of the pillars of support being arranged in vertical planes, requires the most effectual means for counteracting shocks."

Cope's contributions to this subject in the way of materials drawn from fossil vertebrates are extensive and weighty. He, and also Ryder, have discussed the molding of the limb-joints as the result of mechanical strains; also the origin of the teeth, through mechanical strains and impacts. Thus the origin of the canine, pseudo-canine and canine-like incisor teeth "is due to

the strains sustained by them on account of their position in the jaws at points which are naturally utilized in the seizing of prey, or the fighting of enemies." For example the greatly increased size of the canine teeth of the walrus is due to the use of these teeth in the breaking of ice, and in climbing from the water upon the edge of the floe ice. It is so, adds Cope, with the straight incisors of the hippopotamus, "use as diggers has straightened them to a horizontal from their primitive vertical direction, a change which is also partially accomplished in the true pigs (*Sus*)."

The molar teeth owe their increased diameters to much more severe direct irritation and impact. The origin of the sectorial or shear-like molar teeth of the cat, lion, and other carnivora is thus explained by Cope: "The specialization of one tooth to the exclusion of others as a sectorial, appears to be due to the following causes: It is to be observed in the first place that when a carnivore devours a carcass, it cuts off masses with its sectorials, using them as shears. In so doing it brings the part to be divided to the angle or canthus of the soft walls of the mouth, which is at the front of the masseter muscle. At this point the greatest amount of force is gained, since the weight is thus brought immediately to the power, which would not be the case were the sectorial situated much in front of the masseter. On the other hand, the sectorial could not be situated farther back, since it would then be inaccessible to a carcass or mass too large to be taken into the mouth."

The great length and chisel-like incisor teeth of the squirrel and other rodents also illustrate this subject. Their progressive lengthening through exercise has been explained by Ryder, who shows that the mechanical action involving backward pressure is precisely the opposite of that which has occurred to the carnivora, where the pressure has always been forward owing to the development of the canines.

The direct evidence in favor of the kinetogenetic mode of evolution is greatly strengthened by the discovery of Ameghino in the Tertiary beds of the Argentine republic of one-toed ungulates with two splint bones, and with teeth strikingly like those of the horse, though the animal belongs to a quite different order. The similarity or divergence in shape of the parts is due to the action of similar mechanical conditions in two quite unrelated groups. The same results of strains involved in digging are seen in the fore legs of the fossorial edentates, in the mole, as well as in the mole cricket. Thus as Cope concludes, "in biologic evolution, as in ordinary mechanics, identical causes produce identical results."

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Kine'tograph, a machine, invented by Thos. A. Edison, for taking pictures of moving objects in their changing positions. By means of peculiar mechanism a series of photographs, about 40 to the second, can be taken. So rapidly does this machine work that every motion of a dancer's feet, every twist or turn of an athlete's wrists and arms are reproduced. The impressions are taken on a long strip of gelatine film with such rapidity and accuracy that not the faintest motion is missed.

KINETOPHONOGRAPH — KING

Kine'topho'nograph, an electro-photographic apparatus combining the principles of the kinetograph, the vitascope, and the phonograph, invented by Thomas A. Edison. It is a combination of electricity and photography. A man can sit in his own parlor and see reproduced on a screen the forms of the players in an opera produced on a distant stage, and, as he sees their movements, he will hear the sound of their voices as they talk or sing or laugh.

Kine'toscope, an apparatus invented by Thomas A. Edison for exhibiting the pictures taken by the kinetograph. The kinetoscope displays the pictures to the eye, one after another, so rapidly that they all seem like one scene, with the figures moving about as they do in actual life. Also an instrument invented by Perigal, for illustrating the result of the combination of circular movements of different radii in the production of curves.

The Smithsonian Institution, in Washington, has afforded an excellent example of accelerated speed in its use of the kinetoscope in studying the growth of a plant. Kinetoscopic pictures were taken steadily and systematically as the plant grew; a delicate piece of work which required several months before the film was complete, and involved the use of an automatic flash-light and other contrivances in order that the hourly growth of the plant could be observed from first to last. When the film was finished, however, it could be run through the kinetoscope as fast as the operator wished. As a result the plant could be seen, in the compass of a few minutes, actually growing from seed to maturity, each stage of growth being in the same proportion to all others as in the original development of the plant itself.

King, Albert Freeman Africanus, American physician: b. England 18 Jan. 1841. He was graduated in medicine from Columbian University in 1861, and from the University of Pennsylvania in 1865, was appointed a professor in the medical department of Columbian and later in that of the University of Vermont, and held various posts in professional organizations. He became best known as an advocate of the theory of the transmission of malaria by the mosquito, now generally accepted by experts. He published a 'Manual of Obstetrics' (1882; 8th ed. 1900).

King, Anna Eichberg. See LANE, ANNA EICHBERG KING.

King, Basil. See KING, WILLIAM BASIL.

King, Charles, American journalist, president of Columbia College: b. New York 16 March 1789; d. Frascati, Italy, 27 Sept. 1867. He was the second son of Rufus King (q.v.), and during the residence of his father as American minister at St. James he was sent with his brother to Harrow school. Upon the breaking out of hostilities with Great Britain, King, though a Federalist, deemed it right that the war should be prosecuted to an honorable and successful result; and as a member of the legislature of his native State in 1813, and as a volunteer in the autumn of 1814, he acted upon those sentiments. In 1823 he became associated with Johnston Verplanck in the publication of the 'New York American,' a conservative newspaper, of much political influence and a high

literary character, until 1827, when Verplanck retired and Mr. King continued sole editor. After its publication was discontinued Mr. King was associated in the conduct of the New York 'Courier and Enquirer' 1845-9, when he was chosen president of Columbia College, which office he occupied until 1864.

King, Charles, American soldier and novelist: b. Albany, N. Y., 12 Oct. 1844. He was graduated from West Point in 1866 and was in active service in the United States army till his resignation in 1879. On the outbreak of the war with Spain he was commissioned a brigadier-general of volunteers and later served in the Philippines under General Lawton. In 1901 he became commandant at Orchard Lake Military Academy. He has published a long series of popular novels treating of army and frontier life and people, among the best of which are: 'The Colonel's Daughter' (1883), describing life in a frontier fort; 'Kitty's Conquest' (1884); 'Captain Close and Sergeant Crocus' (1895); and also 'Campaigning with Crook' (1890); 'Trials of a Staff Officer' (1901); etc.

King, Clarence, American geologist: b. Newport, R. I., 6 Jan. 1842; d. Phoenix, Ariz., 24 Dec. 1901. He was graduated from the Sheffield Scientific School of Yale University in 1862, in 1863-6 was a member of the California geological survey under the direction of Prof. J. D. Whitney (q.v.), discovered Mounts Whitney and Tyndall, the highest group in California, and with J. T. Gardiner executed the first survey of the Yosemite Valley. In 1866 he originated the plan for a survey of the western Cordilleran region at its widest point. This plan was finally sanctioned by the government and under the auspices of the army engineering department and King's direction, was executed as the "survey of the 40th parallel" and completed in 1872. The survey has been characterized as a "signal contribution to the material of science." The volume on 'Systematic Geology' (1878), the first of six constituting the report, was written by King and has been highly esteemed. In 1872 certain swindlers sowed a tract in Arizona broadcast with rough gems; the discovery of valuable diamond fields was announced, and companies were organized for the exploration of the find. The "fields" proved to be within the official limits of the 40th parallel survey, and were thereupon examined by King, who detected and proclaimed the fraud. In 1878 King organized the various surveys then active into the United States Geological Survey under the general direction of the secretary of the interior, and was appointed director of the survey. He resigned in 1881, attained a large practice as a mining expert, and undertook an uncompleted series of experiments to determine the action of the primal constituents of the earth under the conditions assumed as existing at the time of its separation from the sun. Partial results were published by him in Silliman's 'Journal' (January 1893) in an article on 'The Age of the Earth.' He wrote also, 'Mountaineering in the Sierra Nevada' (1871), a description of his explorations, and a work of literary as well as scientific value.

King, Edward (by courtesy VISCOUNT KINGSBOROUGH), Irish archaeologist: b. Cork 16 Nov. 1795; d. Dublin 27 Feb. 1837. He is best

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known for his great and important work, 'Antiquities of Mexico, comprising Facsimiles of Ancient Paintings and Hieroglyphics, etc.,' nine volumes and a portion of a tenth being published 1830-48. Its aim is to establish the fact of the original settlement of Mexico by a tribe of the Israelites. The author spent over \$160,000 on his undertaking, and died in a debtor's prison.

King, Edward, American writer: b. Middletown, Mass., 31 July 1848; d. Brooklyn, N. Y., 27 March 1860. He lived in Paris 20 years as correspondent of American journals. Among his works were: 'My Paris, or French Character Sketches' (1868); 'Kentucky's Love, or Roughing It Around Paris' (1872); 'The Great South' (1875); 'The Golden Spike' (1886); 'A Venetian Lover' (1887), a poem; 'The Gentle Savage' (1888), a popular novel.

King, Grace Elizabeth, American writer: b. New Orleans 1852. She was educated in New Orleans, contributed much to periodicals, and published in the 'New Princeton Review' in 1886-8 Creole sketches which won considerable reputation and constitute the story 'Monsieur Motte' (1888). Among her further works are: 'Tales of Time and Place' (1888); 'Earthlings' (1889); 'Chevalier Alain de Triton' (1889); 'Jean Baptiste Lemoine, Founder of New Orleans' (1892); 'Balcony Stories' (1893); 'New Orleans: The Place and the People' (1896); and 'De Soto and his Men in the Land of Florida' (1898).

King, Henry Churchill, American theologian: b. Hillsdale, Mich., 18 Sept. 1858. He was graduated from Oberlin in 1879, from the Oberlin Theological Seminary in 1882, studied also at Harvard and Berlin, was associate professor of mathematics at Oberlin in 1884-90, associate professor of philosophy in 1890-1, and professor of philosophy in 1891-7. In 1897 he was appointed professor of theology. In 1893 he was a member of the National Educational Association's committee of ten. His works are: 'Outline of Erdmann's History of Philosophy' (1892); 'Outline of the Microcosmus of Hermann Lotze' (1895); 'The Appeal of the Child' (1900); and 'Reconstruction of Theology' (1901).

King, Horatio, American statesman: b. Paris, Maine, 21 June 1811; d. Washington, D. C., 20 May 1897. He learned the printer's trade and published 'The Jeffersonian' in his native town, and subsequently in Portland, 1831-8. The next year he was appointed clerk in the post-office department in Washington; became first assistant postmaster-general in 1854; was postmaster-general January-March 1861; and was the first man in public office to deny the power of a State to withdraw from the Union. He published: 'An Oration before the Union Literary Society of Washington' (1841); 'Sketches of Travel; or Twelve Months in Europe' (1878).

King, John Alsop, American politician: b. New York city 1788; d. 1867. He was the son of Rufus King (q.v.); was educated at Harrow, England, then returned to New York to study law, and was admitted to the bar. In 1812 he served as lieutenant of cavalry, was elected to the State assembly in 1810, and several times re-elected till 1823, when he was elected to the Senate. Though an opponent of Clinton, he

strongly favored the building of the Erie Canal. In 1825 he went with his father to England as secretary of the legation, and on his father's return to the United States on account of ill health, he remained as *chargé d'affaires*. In 1838 he was again a member of the New York legislature for several terms; and in 1849 he was elected to Congress as a Whig and there opposed all compromise measures, especially the Fugitive Slave Law. He was one of those active in the founding of the Republican party, presided at the Syracuse convention of 1855; and was a delegate to the Philadelphia convention of 1856. In 1857 he became governor of New York State and in that office gave special attention to educational matters and internal improvements; he declined a renomination in 1860. He was one of the presidential electors in 1860, voting for Lincoln, and in 1861 was a member of the Peace Convention.

King, John Crookshanks, American sculptor: b. Kilwinning, Ayrshire, Scotland, 11 Oct. 1806; d. 18—. He was educated as a practical machinist, and emigrating to the United States in 1829 was employed for several years in Cincinnati and Louisville as superintendent of a factory. In 1834, at the suggestion of Hiram Powers, he made a model in clay of the head of his wife, and the success with which the work was accomplished encouraged him to adopt the profession of a sculptor. From 1837 to 1840 he resided in New Orleans, and modeled a number of busts of public men and made cameo likenesses, but subsequently removed to Boston. He executed several busts of Daniel Webster, also busts of John Quincy Adams, Agassiz, Ralph Waldo Emerson, and other Americans prominent in public life or literature.

King, Preston, American legislator: b. Ogdensburg, N. Y., 14 Oct. 1806; d. Hudson River, near New York, 12 Nov. 1865. He was graduated from Union College in 1827, studied law, entered practice in St. Lawrence County, N. Y., early engaged in politics, and in 1830 established at Ogdensburg and became editor of the 'St. Lawrence Republican' in support of Andrew Jackson. In 1834-7 he was a member of the New York State assembly, in 1843-7 and 1849-53 served in Congress as a Democratic representative, but in 1854 joined the Republican party, whose candidate he was for secretary of state in 1855. He was a Republican member of the Senate in 1857-63, was largely instrumental in obtaining the nomination of Johnson for the vice-presidency at the Republican national convention (Baltimore) of 1864, and when Johnson became President was appointed collector of New York port.

King, Rufus, American statesman: b. Scarborough, Maine, 24 March 1755; d. Jamaica, L. I., 29 April 1827. He was graduated from Harvard in 1777 and admitted to the bar in 1778. In 1782 he entered the Massachusetts legislature and Congress in 1784. He took an active part in convention which framed the Federal Constitution, and removing to New York in 1788 became a senator from that State the next year, serving 1789-96. He was United States minister to Great Britain 1796-1803, and after some years spent in partial retirement was sent for the third time to the Senate in 1813, and won renown as an orator by the brilliant speech he made on the burning of Washington by the

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British. In 1819 he was again elected to the Senate, serving till 1825, when he was appointed the second time minister to the court of St. James. He was the Federalist candidate for the vice-presidency in 1804 and 1808. In collaboration with Hamilton, he wrote the 'Camilus Letters.'

King, Rufus, American journalist and soldier: b. New York 26 Jan. 1814; d. there 13 Oct. 1876. He was graduated from West Point in 1833, entered the engineer corps, resigned from the army in 1836, became assistant engineer of the New York & Erie Railway, and was adjutant-general of New York State 1839-43. He was associate editor of the Albany *Evening Journal*, and in 1841-5 editor of the Albany *Advertiser*. Having then removed to Wisconsin, he was editor of the Milwaukee *Sentinel and Gazette* in 1845-61, and in 1847-8 a member of the State constitutional convention. In May 1861 he was commissioned brigadier-general of Wisconsin volunteers. He commanded the 1st division of the 3d army corps in the department of the Rappahannock in March-August 1862, was a member of the court-martial for the trial of Maj.-Gen. Fitz-John Porter (1862-3), resigned 20 Oct. 1863, and was minister at Rome in 1863-7. In 1867-9 he was deputy customs collector of New York port. He was a son of Charles King (q.v. 1789-1867).

King, Stanton Henry, American sailors' missionary: b. Paynes Bay, Barbados, 1 May 1867. He went to sea at 12 years old and in his books 'Dog Watches at Sea' (1900) and 'A Bunch of Rope Yarns' (1902); he has related many of his personal experiences. He became superintendent of the Sailors' Haven, Charlestown, Boston, Mass., in 1898.

King, Thomas Starr, American Unitarian clergyman and lecturer, generally known as Starr King: b. New York 17 Dec. 1824; d. San Francisco 4 March 1864. He was a clerk in a dry goods store at Charlestown, Mass., in 1836-40, a teacher at Boston and Medford in 1840-2, studied theology with Hosea Ballou at Medford, preached for a time to a Universalist congregation of Boston, and in 1846-8 was pastor of the Universalist Church at Charlestown. In 1848-60 he was pastor of the Hollis Street Unitarian Church of Boston, and during this period gained great popularity as a lyceum lecturer in the northern States. Best-known was his 'Substance and Show' but other familiar subjects were 'Goethe,' 'Sight and Insight,' 'The Laws of Disorder,' 'Socrates.' He became pastor of the First Unitarian Society of San Francisco in 1860; was among the first, by newspaper article and lecture, to call attention to the Yosemite Valley; and when, in the presidential campaign of 1860, the idea of the establishment of California as an independent Pacific republic was discussed, denounced the project from the lecture platform and preserved the State to the Union. During the Civil War he was active in obtaining in California large and necessary funds for the Sanitary Commission. His name was at one time associated with the White Mountains, which he thoroughly explored, and which became known chiefly through his writings, particularly 'The White Hills: Their Legends, Landscape, and Poetry' (1859; new ed. 1887). A memorial to him was set up in Golden Gate Park, San Francisco, Cal., in 1889. King was

one of the leading figures of the American lyceum in the most flourishing days of that institution. 'Patriotism, and other Papers' appeared posthumously (1865); as did the sermon 'Christianity and Humanity' (1877), with a memoir by E. P. Whipple, and the collection of lectures, 'Substance and Show' (1877). Consult also: Frothingham, 'A Tribute to Thomas Starr King' (1865).

King, William, American politician, first governor of the State of Maine: b. Scarborough, Maine, 1768; d. Bath, Maine, 17 June 1852. He was, during the greater part of his life, the last 50 years of which were passed in Bath, an active and successful merchant, but is better known by his public services in his native State. At an early period of his career he became a member of the Massachusetts legislature, and in that capacity was distinguished by his efforts in behalf of religious freedom, and of securing to original settlers upon wild lands the benefit of their improvements. He was an early and ardent advocate of the separation of Maine from Massachusetts, and upon the consummation of that act presided over the convention which met in 1819 to frame the constitution of the new State. He was subsequently elected the first governor of Maine, and, after holding office a little more than a year, became one of the United States commissioners for the adjustment of Spanish claims. He also held other offices of importance under the general and State governments, including that of collector of the port of Bath.

King, William Basil, American Episcopal clergyman and novelist: b. Charlottetown, P. E. I., 1857. After taking orders in the Episcopal Church he was for some years rector of St. Luke's Church, Halifax, N. S., and from 1871 to 1899 was rector of Christ Church, Cambridge, Mass. He is the author of 'Griselda' (1899); 'Let Not Man Put Asunder' (1902); etc.

King, William Rufus, American statesman, 13th Vice-President of the United States: b. Sampson County, N. C., 6 April 1786; d. in Dallas County, Ala., 17 April 1853. He entered the University of North Carolina at 12, and was graduated in 1803. He then commenced the study of law and was admitted to the bar in 1806. In 1806 he was elected to the legislature from his native county, and again in 1809. In 1810 he was elected to Congress, and was twice re-elected. In Congress he united himself with Clay, Calhoun, and others, who advocated the war policy of Mr. Madison's administration, and voted for the declaration of war in June 1812. In the spring of 1816 he resigned his seat to become secretary of legation to Naples under William Pinckney. The latter was afterward transferred to St. Petersburg, and was accompanied to that court also by King as secretary. Having removed to Alabama, he was elected in 1819 one of the United States senators from the new State, and was successively re-elected in 1823, 1828, 1834, and 1840. In April 1844, he was appointed minister to France. The proposition for the annexation of Texas was then pending. England was known to be decidedly opposed to the scheme, and there was a general belief that her government was urging France to join in a protest against it. King was an active advocate of the annexation, and upon reaching Paris directed his ef-

KING—KING SALMON

forts to prevent this joint protest, in which he was successful. He returned to the United States in November 1846. In 1848 Senator Arthur P. Bagby was sent as minister to Russia, and King was appointed to fill the vacancy thus created. In 1849, the term for which he was appointed having expired, he was elected for a full term of six years. In 1850, on the accession of Vice-President Fillmore to the presidency, King was unanimously elected president of the Senate. In 1852 he was elected Vice-President of the United States, at the time Franklin Pierce was elected President.

King, a person vested with supreme power in a foreign state, territory or nation. According to feudal usages the king was the source from which all command, honor and authority flowed; and he delegated to his followers the power by which they exercise subordinate rule or authority. There is now no very clearly marked distinction between a king and an emperor. A queen-regent, or a princess who has inherited the sovereign power in countries where female succession to the throne is recognized, possesses all the political rights of a king.

King-at-arms, an officer of great antiquity, whose business it is to direct the heralds, preside at their chapters, and have the jurisdiction of armory. There are three kings-at-arms in England, Garter, Clarencieux and Norroy. The first is called the principal king-at-arms, the other two provincial kings-at-arms.

King Charles Spaniel. See DOG; SPANIEL.

King Conch, the great wing-shells of the genus *Strombus*, especially *S. gigas* of the West Indies and *S. pugilis* of Florida. The large helmet-shells (*Cassis*) of the same region are often called "queen conchs."

King Cotton, a popular name given the cotton plant in the United States. "Cotton is king" was a frequent declaration before the Civil War, when the supremacy of cotton in commerce and politics was strongly asserted by public men, especially in the South.

King-crab. See HORSEFOOT CRAB.

King-crow. See DRONGO.

King-dory, a bird-dealers' name for the Australian parrots of the genus *Aspromictus*.

King Duck, the spectacled eider. See EIDER DUCK.

King George's Sound, an inlet in western Australia; five miles broad; it is an excellent roadstead, and contains two landlocked recesses, Princess Royal and Oyster Harbors. Albany, on Princess Royal Harbor, is a port of call for mail steamers.

King George's War, a war of Great Britain and its American colonies, against France and its Indian allies (1743-8), so named from King George II. See COLONIAL WARS.

King Henry the Fourth, a historical play by Shakespeare in two five-act parts. Part I., published in 1598, stands at the head of all of Shakespeare's historical comedies. Part II. forms a dramatic whole with the preceding. It was published in 1600.

King Henry the Fifth, a historical drama by Shakespeare, first printed in 1600, the

materials being derived from Holinshed and an earlier drama play on the same subject.

King Henry the Sixth, a historical drama by Shakespeare in three five-act parts. Of the eight closely-linked Shakespearian historical plays, these three are the last but one. The eight cover nearly all of the 15th century in this order: 'Richard II.'; 'Henry IV.' parts i. and ii.; 'Henry V.'; 'Henry VI.' (three parts); and 'Richard III.'. The three parts of 'Henry VI.' like 'Richard II.' present a picture of a king too weak-willed to properly defend the dignity of the throne.

King Henry the Eighth, a historical drama by Shakespeare, based on Edward Hall's 'Union of the Families of Lancaster and York,' Holinshed's 'Chronicles,' and Fox's 'Acts and Monuments of the Church.' The action covers a period of sixteen years, from the Field of the Cloth of Gold, in 1520, to the death of Queen Katharine in 1536.

King John, a drama based upon an older play published in 1591. The date of the action is 1200 A.D. John is on the throne of England, but without right; his brother, Richard the Lion-Hearted, had made his nephew Arthur of Bretagne his heir. Arthur, a lad of 14, is the pride of his mother Constance. The maternal affection and the sorrows of this lady form a central feature of the drama. Arthur's father, Geoffrey, has long been dead, but his mother has enlisted in his behalf the kings of Austria and of France. Their forces engage King John's army under the walls of Angiers. While the day is still undecided, peace is made, and a match formed between Lewis, dauphin of France, and John's niece Blanche. The young couple are scarcely married when the pope's legate causes the league to be broken. The armies again clash, and John is victorious, and carries off Prince Arthur to England, where he is confined in a castle and confided to one Hubert. John secretly gives a written warrant to Hubert to put him to death. The scene in which the executioners appear with red-hot irons to put out the boy's eyes, and his innocent prattle with Hubert is one of the most famous and pathetic in all the Shakespearian historical dramas. Hubert relents; but the frightened boy disguises himself as a sailor lad, and leaping down from the walls of the castle, is killed. Many of the powerful lords of England are so infuriated that they join the Dauphin, who has landed to claim England's crown in the name of his wife. King John meets him on the battlefield, but is taken ill, and forced to retire to Swinstead Abbey. He has been poisoned by a monk, and dies in the orchard of the abbey in great agony.

King Lear, by Shakespeare. See LEAR.

King-monkey, a monkey of the African semnopithecine genus *Colobus*, of which there are several species, one of which is the guereza (q.v.).

King-nut, the shag-bark hickory (q.v.).

King Penguin. See PENGUIN.

King Philip's War. See COLONIAL WARS IN AMERICA.

King Rail. See RAIL.

King Salmon or **Quinnat**, the most important of the several species of salmon found

KING SNAKE—KINGFISHER

on the Pacific coast of the United States; called also Chinook or Columbia River salmon (*Oncorhynchus tshawytscha*). It is especially abundant in the Columbia and Sacramento rivers, and its great economic importance is due to the fact that it enters the rivers in large numbers in the spring. See SALMON OF THE PACIFIC.

King Snake, a large colubrine snake of the southern part of the United States (*Ossela doliata*, of which the northern house-snake is a variety), so called on account of the belief in its power and prowess, especially in overcoming rattlesnakes. It is grayish white, marked by a series of black rings in a manner so variable that many color-varieties have been named. It sometimes reaches a length of ten feet, is extremely muscular and swift, and preys upon frogs, toads and upon snakes, including poisonous ones. Hence this serpent is much respected and rarely killed in the less settled parts of the Southern States. Several other species are known, one of which (*O. coccinea*) is red with black bands, and called the red king snake. These snakes are reproduced by eggs buried in sandy soil or loose dust, like that of a rotting stump. The chain-snakes (q.v.) of the allied genus *Ophiobolus* have an equal right to the name "king snake," and frequently receive it. Consult: Holbrook, "North American Herpetology," Vol. III. (142).

King Vulture. See CONDOR.

King William's War, a war waged by Great Britain and its colonies in America against France and its Indian allies in 1689-1697. See COLONIAL WARS.

King of the Herrings, a fanciful name applied to various sea-fishes. One so called is the moonfish (*Lampris luna*). Another is the rare deep-sea ribbon-fish (*Trachipterus arcticus*) of the North Atlantic. A species of the same family (*Trachypteridae*) occurs occasionally on the northwestern American coast, and was called by the Indians about the Straits of Fuca "King of the Salmon," in reference to their belief that the killing of this fish would be followed by a failure of the salmon supply.

King of the Mackerels, a strange oceanic fish of the genus *Ranzania*, allied to the ocean sunfish (*Mola*), various species of which are superstitiously so called in various parts of the world. One kind (*R. truncata*) is now and then taken in the North Atlantic; and a Hawaiian and Japanese species is *R. makua*. Consult Goode and Bean, "Oceanic Ichthyology" (1895).

King of the Mullets. See CARDINAL-FISH.

King of the Salmon. See KING OF THE HERRINGS.

Kingbird, one of the most familiar representatives in the United States of the tyrant flycatchers (*Tyrannidae*). The typical genus is distinguished by the concealed flame-colored crest, attenuate outer primaries and square tail, and contains many species. The eastern kingbird (*Tyrannus carolinensis*) is found throughout the United States, but rarely in the Southwest or west of the Rocky Mountains; it also enters the British provinces and breeds throughout this range; in winter it migrates into Mexico, Central and South America. It is a plain little bird about eight inches long, nearly black above and quite so on the head,

this color there contrasting greatly with the brilliant flame color of the crest, which can be concealed or erected at will; the tail is tipped with white, and the under parts are wholly white. The young lack the highly colored crown. The most distinctive trait of the kingbird is pugnacity, and during the nesting season no bird may come near its home without being attacked and almost invariably routed. Even crows, hawks, and eagles fly before its fearless and vigorous onslaughts. On account of the large gape of the mouth, the spreading bristles at its sides, and the flat, broad bill, the kingbird, in common with related species, is an adept in capturing flying insects, which constitute its almost exclusive food. In some localities it is known as the bee-martin, and has gained a bad reputation as a destroyer of honey-bees, but it destroys a thousand noxious insects for every bee it eats. The nest is a bulky structure saddled in a conspicuous position on a limb or fork usually of an apple-tree, and the eggs are usually rosy white, boldly spotted with brown and lilac. Two additional species of kingbirds are found in the West and two in the South. Consult: Wilson, "American Ornithology" (1834); Baird, Brewer and Ridgway, "History of North American Birds" (1874); Coues, "Birds of the Northwest" (1874).

Kingfish, the name of various fishes of notable power or superior excellence; especially certain "Spanish mackerels" of the genus *Scomberomorus*. One, the cavalla or "King cero" is a favorite game fish in Florida (see CERO). The kingfish of New York waters (*Menticirrhus saxatilis*) is one of the whiting, of the family *Sciaenidae*, closely allied to the drums (see WHITING). It is a moderately large migratory marine fish, "dusky gray above, sometimes blackish, the back and sides with distinct dark oblique cross-bands running down and forward," and a V-shaped blotch on each side of the nape. It is also known as "sea-mink," and is an excellent food-fish, but has become rare, although formerly ascending the Hudson River in schools, in early spring, for 40 miles or so. Other fishes so called are the little roncador (q.v.) of California, and the opah (q.v.). Consult: Jordan and Evermann, "American Food and Game Fishes" (New York, 1902).

Kingfisher, a bird of the family *Alcedinidae*, characterized by the short, compact body and large head, with a large, straight, acute bill; the somewhat usually short, square tail of twelve rectrices, the short rounded wings having ten primary quills; the short, weak legs and nearly unique cohesion of the middle and outer toes. Two sub-families are commonly recognized, the *Dacelonina*, or "Kinghunters," with a broader, depressed, sometimes curved bill and usually insectivorous habits; and the *Alcedinidae*, or true kingfishers, with a compressed, cererated bill, and usually piscivorous. About twenty genera and 125 species have been described, half of which are confined to the Australian region. About five genera and 50 species are distributed between tropical Africa and Asia, one species alone, the brilliantly colored *Alcedo ispida*, is found in Europe; while all of America has only eight species of *Ceryle*, three of which extend their range into the United States. Of these three, two (*Ceryle*

KINGHUNTER—KINGS

torquata and *C. americana*), are really Mexican and Central American, but the third, the belted kingfisher (*C. Alcyon*), is a widely distributed and highly characteristic member of the North American avifauna. Throughout North America, from the shores of the Arctic Ocean to the Gulf of Mexico, and from the Atlantic to the Pacific, is the summer breeding-home of the belted kingfisher, which in winter retreats south of the limit of freezing. The large, crested head, very large bill, and deep blue color, with black and white markings and largely white under parts, give to this bird a very characteristic aspect, which is heightened by its peculiar habits. Each pair selects a hunting-ground somewhere in the vicinity of water, and other pairs seldom intrude upon this preserve. There the kingfisher perches on a tree overhanging the water and watches for the passage of a fish, when it plunges headlong and usually emerges with a small fish held firmly in the beak. As it rises a spasmodic shake dispels the water from its compact oily plumage, and on returning to its perch, the fish is usually tossed into the air and swallowed head first. Sometimes the kingfisher hunts more in the manner of a tern and plunges from a suspended position in mid-air. The only call is a peculiarly loud, harsh, rattling cry. A burrow six to nine feet long, dug horizontally into a bank, serves as a nesting place, in the slightly enlarged end of which the six or eight pure white eggs are laid on a bed of regurgitated fish bones.

The dacelonine kingfishers have very different habits, and might more properly be called king-hunters. They are usually woodland birds, caring little for the neighborhood of water, since their food consists of insects caught mainly on the wing, or else of tree-frogs, lizards and other small reptiles found on the ground or about trees. The jackass kingfisher (q.v.) of Australia is a prominent example. A peculiar group of the Papuan Islands (genus *Tanysiptera*) has long, racket-shaped tail-feathers and other peculiarities of plumage. The small East Indian species of *Ceyx* have only three toes. Those of Africa are inhabitants of deep woods, but when hard pressed for food will resort to streams and pick up small fishes. All these breed in holes in trees and not in earth-burrows.

Consult: Sharpe, 'Monograph of the Alcedinidae'; Evans, 'Birds' (Cambridge Natural History, Vol. IX.); and American and European ornithologies.

Kinghunter, a kingfisher of the sub-family *Daceloninae*; specifically the jackass kingfisher (q.v.).

Kinglake, Alexander William, English historian: b. Taunton, Somerset, 5 Aug. 1809; d. 2 Jan. 1891. He was educated at Eton and Cambridge, was called to the bar in 1837, but ceased to practise in 1856. He represented Bridgewater in the Liberal interest in Parliament from 1857 to 1868, when Bridgewater was disfranchised. His distinction as a writer rests upon two books: 'Eothen, or Traces of Travel Brought Home From the East' (1844); and 'The Invasion of the Crimea,' in eight volumes, (1863-87). The former is marked by truth to nature, poetry, humor, and imagination; the latter (which is partly the result of personal observation) is an equally brilliant performance

in its own way, almost exhaustive in its details, picturesque and telling in description and narrative, but open to the charge of prejudice in some points, his great dislike of Napoleon III. frequently appearing. Consult: Tuckwell, 'Alexander William Kinglake' (1901).

Kinglet, a very small bird of the thrush family dwelling in northern forests and visiting southern Europe and the United States only in winter. These smallest of songsters, hardly more than 4 inches in total length, are olive-green and gray in color, with a half-concealed yellow crest in one of the two species, the gold-crest (*Regulus Satrapa*), and a flame-colored one in the other (*R. calendula*), called ruby-crown. These tiny birds go about in small lively flocks, and have no hesitation in attacking a crow, jay or hawk with the spiteful fury that long ago won them the name "kinglet" among European peasants. Both, especially the ruby-crown, sing sweetly in the spring before going to some mountain-top or northern forest to make their cup-like nests in some evergreen tree. See GOLD-CREST.

King's Bench, Court of. See COURT.

Kings, Books of, I. and II., canonical books of the Old Testament, forming one book in the Hebrew canon. In the Septuagint version there are various omissions, additions, transpositions, and glosses, which do not in general appear to rest on any authentic authority, and sometimes bear evident traces of later invention. Besides their internal unity the books of Kings are closely connected with those which precede them in the canon, I. and II. Samuel, and even Judges and Ruth, so that some authorities suppose the whole of these books to be a single compilation. Taking the books of Kings alone there is internal evidence throughout that their compilation was subsequent to the destruction of the Jewish monarchy, and in the later chapters much to corroborate the Jewish tradition that Jeremiah, with whose book of prophecies they present many points of agreement, was the compiler. By whomsoever they were compiled, these books, as well as Judges, Ruth and Samuel, are evidently taken from a series of contemporary authorities, being, as shown by citation, the official annals as well as the prophetic writers of the successive periods. These authorities are often followed so literally that when a comment is introduced it is uncertain whether it is that of the original writer or of the compiler; thus the expression which frequently occurs in reference to memorials of occurrences that they remain to this day sometimes implies the existence of the monarchy, the temple, or something else known not to exist in the time of the compiler. The books of Kings thus contain authentic accounts of contemporary history during the whole period of the Jewish monarchy. They begin with the close of the reign of King David, and the history is carried down consecutively to a period subsequent to the capture of Jerusalem and the destruction of the temple, embracing, according to the received chronology, a period of upward of 400 years (1015-588 B.C.), and including the history of both the kingdoms of Judah and Israel. The facts recorded in regard to the foreign relations of these kingdoms from the conquest of Rehoboam by Shishak, king of Egypt, to the

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captivity in Babylon, have been remarkably confirmed by modern discoveries. The outline of events recorded in Kings is also frequently supplemented by much fuller details in the prophetic books, particularly Isaiah and Jeremiah. The text of the books of Kings is not considered by critics to be very pure. The chronology is in a very unsatisfactory state, being difficult to reconcile with other authorities, and in many passages inconsistent with itself. The books of Kings differ from the Chronicles in comprising the history of the separate kingdoms of Israel and Judah, while the Chronicles are occupied almost exclusively with that of Judah. It is also to be observed that the Kings contain much fuller notices of the contemporary prophets, while the Chronicles are more full in describing the temple worship and the ceremonials of the Levitical law. This may, perhaps, be regarded as confirming the hypothesis which ascribes the authorship of the former to Jeremiah the prophet, while the reputed author of the Chronicles was Ezra the priest.

King's Chapel, a religious edifice in Tremont Street, Boston, Mass., built in 1745 on the site of an older church. During the War of the Revolution it was for a time forsaken by its loyalist congregation. In the burial ground adjoining which has been in use since 1630, many of the early Puritans, including Gov. Winthrop, are interred.

King's College, a college of Cambridge University, England, founded by Henry VI. in 1441. The college had in 1902 a provost, 46 fellows, 48 scholars, 120 undergraduates. The college chapel is the finest in the world in size, form and decoration. It contains some of the best glass and wood carving examples in England.

King's College, London, a college established by private subscription and incorporated in 1829, its constitution being amended by an act of Parliament in 1882. The buildings are adjacent to those of Somerset House. It was established for the purpose of providing an education in accordance with the principles of the Established Church. Education is imparted in the departments of theology, general literature and science, applied sciences and engineering, and medicine. The department of general literature and science is intended to prepare students for the universities, for the army, and the Indian and home civil service; and there are also special classes for civil service candidates. There is a department for women. The college possesses a library and a museum. It is now a constituent college of London University.

King's Daughters and Sons, International Order of the, an organization of men, women and children of all religious denominations, whose object is to minister to the sick and needy wherever found, and to do good to all with whom they come in contact. The original circle (of women) was formed in New York in 1886, and its members are found in almost every State in the Union. There are also branches in several foreign countries. The badge is a small silver Maltese cross, generally suspended by a purple ribbon and bearing the initials "I. H. N." (In His name). The society publishes a weekly paper, 'The Silver Cross.' The membership in 1903 was over 500,000.

King's (or Queen's) Evidence, the British equivalent of State's evidence. See **INFORMER**.

King's Evil. See **SCROFULA**.

King's Mountain, N. C., a village in York County, 80 miles northeast of Columbia. In the vicinity is a high hill where a battle took place 7 Oct. 1780, between the Americans, under Levier, Shelby, Campbell and William, and the British, under Ferguson. The latter were defeated with a loss of 456 killed and wounded, among whom was the commander, and 648 taken prisoners after an hour's fighting. Ferguson, shouting to his men: "Crush the damned rebels to the earth," prepared for one final charge, and fell at the head of his regulars pierced by seven bullets, dying, according to tradition, by the hand of Col. Williams, who was also slain. His men, disheartened by his fall, surrendered. The Americans lost only 20 men killed, although a large number were wounded. After the battle 10 of the prisoners notorious for their crimes were hanged, having first been regularly tried and condemned by their captors. This was one of the most brilliant victories of the war, and exercised an important influence in precipitating the downfall of British power in the South. The 75th anniversary of the battle was commemorated by a celebration on the ground.

Kings'ford, William, Canadian historian: b. London, England, 12 Dec. 1819; d. Ottawa, Ont., 29 Sept. 1898. He entered the army and came to Canada in an English regiment in 1841. He then took up surveying and engineering, and was at various times employed upon the construction of the Hudson River, Panama, Grand Trunk, and Canadian Pacific railways. He made his home in Canada and published 'The History, Structure, and Statistics of Plank Roads in the United States and Canada' (1851); 'The Canals: Their History and Cost' (1865); and 'The History of Canada' (1880), a well-known work; etc.

Kingsley, kingz'li, Charles, English clergyman, novelist, and poet: b. Holne Vicarage, near Dartmouth, Devonshire, 12 June 1819; d. Eversley, Hampshire, 23 Jan. 1875. He was a pupil of Derwent Coleridge (q.v.) from whose care he passed to King's College, London, and thence to Magdalen College, Cambridge, where he was graduated with high honors in 1842. Soon after graduation he took orders in the Established Church and obtained the curacy of Eversley, and became its rector in 1844. This living he retained till his death, but he also held in succession two canonries, one in the cathedral of Chester 1869-73, and one in the chapter of Westminster from 1873 till his death. From 1860 to 1869 he was professor of modern history at Cambridge. Early in his career as a clergyman of the Church of England he associated himself with F. D. Maurice, Julius Hare, and others, both in their religious views and in their social aims. With them he considered it the peculiar duty of the Church to improve the condition of the working-classes, not only by inspiring them with Christian feeling and Christian principle, but also by encouraging and aiding them in bettering their material position. With the latter object he was a strong advocate of co-operative association. His first literary works of importance, 'Alton Locke, Tailor and Poet' (1850), and 'Yeast, a Problem' (1851), gave expression to his sentiments on social ques-

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tions, and both of them, but especially the first, made a great impression when they appeared. The principal of his later novels are '*Hypatia*' (1853), '*Westward Ho!*' (1855), perhaps the most popular of his stories, and '*Hereward the Wake*', '*Last of the English*' (1866). Other works of his are '*Glaucus, or The Wonders of the Shore*'; '*Town Geology*'; '*The Roman and the Teuton*', historical lectures; '*The Water Babies*', a fairy-tale of science; and '*At Last*', a visit to the West Indies. He was also the author of numerous sermons, lectures, and essays, and of various poems, the chief of which are '*The Saint's Tragedy*', and '*Andromeda*', the latter one of the most successful experiments in English hexameter. Consult: '*Letters and Memories of Charles Kingsley*', by his wife (1877).

Kingsley, Elbridge, American artist and engraver: b. Carthage, Ohio, 17 Sept. 1842. He was graduated at Hopkins Academy, Hadley, Mass., and proceeded to New York where he studied art at Cooper Union. He began engraving for the Century Company in 1878, and started the School of Painter Engraving in 1880 with original work. He is one of the artists who have been instrumental in raising the school of American engraving to the high rank in the art world which it now enjoys.

Kingsley, Florence Morse, American novelist: b. Medina, Ohio, 14 July 1859. She was educated at Wellesley College and was married in 1882 to Charles R. Kingsley. She has published '*Titus: a Comrade of the Cross*' (1894); '*Stephen*' (1896); '*Paul*' (1897); '*Prisoners of the Sea*' (1897); '*The Cross Triumphant*' (1899); '*The Transfiguration of Miss Philura*' (1901); '*Through a Needle's Eye*' (1902); '*Wings and Fetters*' (1902).

Kingsley, Henry, English novelist, brother of C. Kingsley (q.v.): b. Barnack, Northamptonshire, 1830; d. 24 May 1876. After being educated at King's College, London, and Worcester College, Oxford, he went to Australia, where he spent five years, returning to England in 1858. He was editor of the *Daily Review*, Edinburgh, 1870-1, was its war correspondent during the Franco-Prussian War, and as such was present at the battle of Sedan. In 1859 he published '*Recollections of Geoffrey Hamlyn*', a vigorous novel of Australian life, and this was succeeded by '*Ravenshoe*' (1861); '*The Hillyars and the Burtons*' (1865); also a study of Australian life; '*Leighton Court*' (1866); '*Silcote of Silcotes*' (1867); '*Stretton*' (1869); '*Hetty*' (1871); '*Ois Margaret*' (1871); etc.

Kingsley, James Luce, American educator: b. Windham, Conn., 27 Aug. 1788; d. New Haven, Conn., 31 Aug. 1852. He was graduated from Yale in 1799 and spent the remainder of his life there, as tutor 1801-05, and professor of Hebrew, Greek and Latin 1805-51. He was noted for the purity of his Latin style. He published a '*History of Yale College*' (1835); '*Life of President Stiles*', and highly prized editions of '*Tacitus*' and '*Cicero de Oratore*'.

Kingsley, John Sterling, American zoologist: b. Cincinnati, N. Y., 7 April 1854. He was graduated from Williams College in 1875, was professor of zoology at the University of

Indiana 1877-9; and at the University of Nebraska 1889-91, and has filled a similar position at Tufts College from 1892. He edited '*The American Naturalist*' (1886-96) and has published '*Elements of Comparative Zoology*'; '*Vertebrate Zoology*'; '*Popular Natural History*' (1890).

Kingsley, Mary Henrietta, English traveler and author: b. London 13 Oct. 1862; d. Simonstown, Cape Colony, 3 June 1900. She was a niece of Charles and Henry Kingsley. She made journeys to West Africa in 1893-4 and 1894-5, visiting Ambriz, the Kongo, and Old Calabar on the former, and ascending Mungo Mah Lobeh (13,700 feet) on the latter. She made important zoological collections, and recounted her experience in the interesting volume '*Travels in West Africa*' (1897). Her other books are: '*West African Studies*' (1899), essays; and '*The Story of West Africa*' (1899), in Marshall's '*Empire*' series.

Kings'mill Group. See GILBERT ISLANDS.

Kingston, king'stōn, William Henry Giles, English novelist: b. London 28 Feb. 1814; d. Willesden, Middlesex, 5 Aug. 1880. His youth was spent in Oporto, Portugal, and having aided in arranging a commercial treaty between England and Portugal he was knighted by the Queen of Portugal in 1842. He wrote almost though not quite exclusively for boys, producing 130 stories in 30 years; mostly of sea voyage and adventure, which were very popular. '*Peter the Whaler*' (1851); '*The Cruise of the Frolic*' (1860), the series beginning with '*The Three Midshipmen*' (1873); '*Joviman*' (1877); etc., won for him thousands of readers, both young and old.

Kingston, Canada, city, port of entry, capital of Frontenac County, in the province of Ontario; at the mouth of the Cataraqui and on the Bay of Quinté, an inlet of Lake Ontario, and where the Saint Lawrence begins. The Rideau Canal connects Kingston with Ottawa. It is on the Grand Trunk, the Canadian P., the Kingston & P. R.R.'s, and is about 160 miles by rail north-northeast of Toronto, and 180 miles southwest of Montreal. The harbor sheltered by Navy and Wolfe islands, is considered one of the best on the Lake. It is a strongly fortified city; its fortifications rank third with that of other cities in Canada; Quebec and Halifax are considered better. Defenses are on Navy Point, Messessaga Point, and Point Henry. The harbor and city are commanded by the fortress at Point Henry. When the early French missionaries visited this locality, they found an Indian village where Kingston now stands. Its hunting and fishing opportunities, the great waterways leading east and west and the routes by smaller streams into the interior, were all appreciated by the Indians. The place was often made the meeting ground when they held councils, and made treaties. In 1673 the French built here a fort and called it Fort Frontenac. In 1758 the British obtained possession, and in 1793 the town began to assume the air of permanency, but it did not lose its military appearance. It was used as naval headquarters by the British in the War of 1812. The United Empire Loyalists changed the name, after the Revolutionary War, from Fort Frontenac to Kingston. In 1838 Kingston was chartered as a city. It was made the capital of Canada, when

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Upper and Lower Canada (Ontario and Quebec) united in 1841, but in 1845 the capital was changed to Quebec. In ship-building it ranks next to Quebec among the Canadian cities. Some of the chief manufactures are locomotives, foundry products, agricultural implements, nails, axles, engines, rolling-stock, leather, pianos, flour, furniture, and confectionery.

Some of the educational institutions are the University of Queens College, Royal Military College, Mechanics Institute, Kingston's Ladies' College, School of Gunnery, Regiopolis College, Saint Vincent's Academy, conservatory of music, business college, and a collegiate and training institute for teachers. It has a general hospital, the Hotel Dieu Hospital, orphan asylums, House of Providence, and just outside the city limits are the Rockwood lunatic asylums and the provincial penitentiary. The Anglican and Roman Catholic cathedrals, the city and county buildings, and several other edifices are well built and add to the attractions of the city. The bronze statue of Sir John A. Macdonald is at the main entrance to the city park. Pop. (1901) 18,043.

Kingston, Jamaica, the capital of the island. See JAMAICA.

Kingston, N. Y., city, county-seat of Ulster County; on the Hudson River, and on the West Shore, the Wallkill Valley, and the Ulster & Delaware R.R.'s; and is connected by ferry with the main line of the New York Central & Hudson River railroad on the east side of the Hudson; about 100 miles north of the city of New York and 55 miles south of Albany. The Wallkill River and Rondout Creek enter the Hudson at Kingston. The first settlement was made here in 1652 by the Dutch. They named the place Esopus. In 1661 they were granted a charter, but as a dependency of Fort Orange (now Albany), the place was called Wilturick. The British obtained possession in 1664 and in 1669 they changed the name to Kingston. On 19 Feb. 1777 the first State convention of the State of New York adjourned from Fishkill to Kingston, and the first State Constitution was proclaimed in front of the court house, on 22 April 1777. On 9 September of the same year, Chief Justice Jay opened in Kingston the first State court. The State legislature met here in September of the same year, but was dispersed by the approach of the British, who entered the place on 7 October and destroyed nearly the whole town by fire. It was rebuilt, and was incorporated as a village in 1805 and chartered as a city in 1872. The city now comprises the former villages of Kingston, Rondout, and Wilbur. The chief manufactures are bricks, motor-trucks, and Rosendale cement. It is the commercial centre for a large extent of country, and has an extensive trade in farm products, coal, cement, lime, lumber, grain, brick, and bluestone. It has the Kingston and Ulster academies, a business college, Our Lady of Victory's Sanatorium, libraries, an armory, a city hall, court house, and several fine churches. The bridge owned by the West Shore Railroad is about 150 feet above tidewater. The "Senate House," the first home of the New York Legislature, contains a collection of relics connected with the early settlement of the country. Kingston Point Park, about 50 acres in extent, and on the Hudson, is being made more

attractive each year. The large steamers now land at this park. The government of the city is vested in a mayor, who holds office two years, and a council. The executive appoints the subordinate officials, subject to approval by the council, except the city judge and the recorder, who are elected by the people. Pop. (1890) 21,261; (1900) 24,535.

Kingston, Pa., borough in Luzerne County, on the Susquehanna River, opposite Wilkesbarre; on the Lehigh Valley and the Delaware & Lackawanna R.R.'s. Here is the seat of the Wyoming Methodist Seminary. The principal industry is coal mining. The repair shops of the Lackawanna Railroad are located here. Kingston was incorporated as a borough in 1858. In the near vicinity in 1778 occurred the famous Wyoming Massacre. Pop. (1890) 2,381; (1900) 3,846.

Kingwood, a kind of wood from Brazil, called also violet wood and jacaranda. It is obtained from a species of *Dalbergia* (q.v.), and is used for turning and cabinet work, as it is hard, dark-colored, and beautifully variegated with violet streaks.

Kinkajou, king'kā-joo. See Porro.

Kinney, kin'ī, **Coates**, American writer: b. Kinney's Corners, N. Y., 24 Nov. 1826. He studied law, was admitted to the bar in 1856 and subsequently edited several Ohio journals. He served in the Federal army during the Civil War, being mustered out in 1865 with brevet rank of lieutenant colonel, and sat in the Ohio Senate, 1881-2. He has published "Keuka" (1855); "Lyrics" (1888); "Mists of Fire and Some Eclogues" (1899), but is best known by the familiar lyric "Rain Upon the Roof."

Kinnikinnik, kin"ī-ki-nik', or **Killikinick**, any of several plants which were used by the Indians, especially in the Western United States, for pipe-smoking, either with or without mixture with tobacco. The principal one was the widespread red bearberry (*Arctostaphylos uva ursi*, see BEARBERRY) whose leaves were dried and powdered. Equally or perhaps more in use in the Upper Missouri region was the dried bark of the new shoots of the osier-cornel, or dogwood (*Cornus stolonifera*) locally known as "red-willow," and of a related species (*C. amomum*) the silky cornel or swamp dogwood, a shrub whose new shoots are smooth and purple red, with ovate leaves covered on the under side with a silvery pubescence, which also clothes the compact cymes; and as the leaves grow older they often become blotched with purple. All these plants contain chemical principles which affect the nerves pleasantly; and many plainsmen learn to enjoy a mixture of Indian kinnikinnik with their tobacco. In the Southern States the country people make a powerful tonic by steeping cornel bark and adding the decoction to corn-distilled whiskey.

Kino, kē'nō, a kind of gum which exudes from certain trees when an incision is made, and is dried without artificial heat. The East Indian or Malabar kino comes from a leguminous tree (*Pterocarpus marsupium*); Bengal or Palas kino from *Butea frondosa*; and Australian or Botnay Bay kino from *Eucalyptus rosiflora*; West Indian from a third plant (*Coccoloba uvifera*). It consists of dark red angular fragments, rarely larger than a pea, and

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easily splitting into still smaller pieces. It is very soluble in spirits of wine, and in general behavior closely resembles catechu, and yields by similar treatment the same products. In medicine it is an astringent and tonic.

Kinsol'ving, George Herbert, American Protestant Episcopal bishop: b. Bedford County, Va., 28 April 1849. He was graduated from the Theological Seminary at Alexandria, Va., and was ordained to the priesthood in 1875. He was successively rector of churches in Baltimore, Cincinnati, and Philadelphia, and in 1892 was consecrated bishop of Texas.

Kin'ston, N. C., town, county-seat of Lenoir County; on the Neuse River, and on the Atlantic & North Carolina and the Atlantic Coast Line R.R.'s; about 78 miles southeast of Raleigh and about 60 miles from Pamlico Sound. It is situated in a fertile agricultural region in which tobacco and cotton are the chief productive crops. Kinston is an important trade centre and contains a number of large warehouses. Its chief industrial establishments are stemmeryes, packing houses, cotton-mills, machine-shops, foundry, wagon works, turpentine distillery, box and barrel factories, shingle-mills, and knitting mills. It is the seat of the Rhodes Military Institute. The city owns the electric light plant. Pop. (1890) 1,726; (1900) 4,106.

Kinston, Battle of. On 1 March 1865 Gen. Cox, with three divisions of infantry, pushed forward from Newbern, N. C., toward Goldsboro to open communication with Gen. Sherman, who was marching northward from Savannah, and on the 7th two of his divisions were at Wise's Forks, near Southwest Creek, a tributary of the Neuse River, with one division three miles in rear. A brigade was advanced to a cross-road about midway between the main line and the creek. Gen. Hoke, with his Confederate division, crossed the creek on the night and early morning of the 7th and 8th, flanked, surprised, and routed the advance brigade, taking over 900 prisoners and, pressing on, fell upon the left of Cox's line, but was repulsed. He renewed the attack and was again repulsed. On the 9th there was sharp skirmishing and the Confederates made repeated efforts to turn Cox's right, which were foiled. On the morning of the 10th Hoke and D. H. Hill made vigorous and successive attacks first upon the left and then on the right of Cox's line, but were repulsed, and Gen. Bragg, who was in supreme command, made no further effort, retreated across Neuse River during the night, burning all bridges behind him, left a small guard at Kinston and, with the rest of his command, hastened through Goldsboro to join J. E. Johnston, who was concentrating everything available to oppose Sherman. Gen. Schofield joined Cox with troops from Wilmington, and reached Goldsboro on the 21st, Sherman joining him two days later. The Union loss at Kinston was 65 killed, 319 wounded, and 930 missing; the Confederate loss is not known. D. H. Hill reports a loss in five brigades of 118 killed and wounded and 16 missing. Schofield estimated the entire Confederate loss at 1,500, which is probably excessive. Consult: 'Official Records,' Vol. XLVII.; Cox, 'The March to the Sea,' and 'Military Reminiscences of the Civil War,' Vol. II.

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Kintyre, kín-tír', a peninsula of Scotland, between the Firth of Clyde and the Atlantic, forming the division of Argyleshire. It is 40 miles long from the Isthmus of Tarbet to the Mull of Cantyre, and has an average breadth of about 7 miles.

Kin'zie, John, American pioneer: b. Quebec, Canada, 1763; d. Chicago, Ill., 6 Jan. 1828. His name was originally McKenzie. For a time he was a jeweler in Quebec, but later became a trader in the western United States, and in 1804 established a post on the site of the present Chicago, of which he was the earliest white settler. He also set up stations on the Illinois, Kankakee, and Rock rivers.

Kiosk', a Turkish word meaning pavilion. It has a tent-shaped roof, open on all sides and is supported by pillars, round the foot of which is a balustrade. It is built of wood, roofed with straw or similar materials, and is chiefly erected to afford a free prospect in the shade, but it also serves to embellish a rural or garden view. This kind of pavilion has been introduced from the Turks and Persians into the English, French, and German gardens.

Kioto, ké-ō'tō, or Kyoto, one of the great cities of Japan, and for over 1,000 years the capital; situated on a flat plain about 26 miles inland from Osaka. A high range of hills to the east separates this plain from Lake Biwa, and on these some of the finest temples connected with the city are built. The city is rectangular in form, the longer streets running north and south parallel to the Kamo River, which flows along the base of the ridge. At the north end are situated in an enclosure the plain wooden buildings where the emperors of Japan dwelt so long in seclusion. The Honganji temples of the Monto sect of Buddhists, fine structures of their kind and the centre of the Buddhist faith in Japan, rise at the south end of the city. The streets, though narrow, are clean and attractive, and the whole city has an air of refinement. The singing girls of Kioto are noted for their graceful dances. The pottery, porcelain, crepes, velvets, and brocades of Kioto are highly esteemed; its embroideries, enamels, and inlaid bronze-works are marvels of skilful handicraft. The capital was not removed from Kioto until 1868, when the Mikado and his court took up residence at Tokio (Yedo). Pop. (1900) 353,139.

Kiowa, ki'o-wā (properly kái-gwū), a considerable Indian tribe now in Oklahoma, whose language forms a distinct stock, who have resisted with unusual virility the physical decay so common among the tribes, and whose pictograph calendar from about 1830 is of scientific interest. In dress and dwellings they are civilized, but otherwise tenacious of their old customs; of which the most prominent were the sun dance, and devotion to a stone image called the Taimé, a sort of guardian deity. They had a military order of six degrees, and were organized in six bands; one of which, inaccurately called the Kiowa-Apache (by themselves "Nadiisháñ-dina"), is an Athapascan tribe immemorially confederated with them. First living (according to their and other tribes' traditions) in the Montana Rockies along the head waters of the Missouri and Columbia, they followed the retreating buffalo herds southward along the plains, allying themselves with the Crows and

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assailed by the Cheyenne and Sioux; halted for a while successively in the Black Hills and along the Platte and Arkansas; at first warring with the Comanches, but since 1790 in confederacy with them, and finally making peace with the Cheyennes and Arapahoes. They became one of the most formidable scourges of the plains, harrying the frontiers of the United States and Mexico. The treaty of Medicine Lodge, Kan., in 1867, enforced (after their disobedience) by Custer's troops during the next winter, placed them, with the Comanches, Cheyennes, and Arapahoes, upon reservations in Oklahoma; they broke loose in 1874, and Mackenzie was obliged to kill their horses and deport their leaders and chief men to Florida. Thenceforth they remained on the reservation. This was thrown open to settlement in 1901, and they accepted American citizenship. Their number, about 1,100, is not very much less than at any time for a century. 'Mooney's Calendar History of the Kiowa Indians'; '17th Report Bureau of American Ethnology' 1898.

Kip, William Ingraham, American Protestant Episcopal bishop: b. New York 3 Oct. 1811; d. San Francisco, Cal., 7 April 1893. He was graduated at Yale College in 1831, entered the General Theological Seminary of the Episcopal Church in New York, and was ordained deacon in 1835. In 1838 he was called to the rectorship of St. Peter's Church, Albany, N. Y., which position he retained until his consecration in 1853 as missionary bishop of California. He published several religious treatises, including 'The Lenten Feast' (1843); 'The Double Witness of the Church' (1844); etc.; and also 'Early Jesuit Missions in North America' (1846); 'Early Conflicts of Christianity' (1850); 'The Catacombs of Rome' (1864); 'Olden Times in New York' (1872); 'Early Days of My Episcopate' (1892).

Kipling, Rudyard (originally JOSEPH RUPYARD), Anglo-Indian author: b. Bombay, India, 30 Dec. 1865. After studying at the United Services College, Westward Ho, North Devon, he returned to India in 1882 as sub-editor of the Lahore 'Civil and Military Gazette,' and was for some time special correspondent on the frontier, in Rajputana, and elsewhere, for that paper and for the Allahabad 'Pioneer.' He left India in 1889 and went to England, after visiting China, Japan, Africa, Australia, and the United States. For several years he resided at Brattleboro, Vt., but later returned to England, and lived at Rottingdean, Sussex. During the second Boer war he visited South Africa as a newspaper correspondent. He first made himself known to a restricted circle of English readers by a volume entitled 'Departmental Ditties' (1886), in which he dealt with the salient features of Anglo-Indian life with directness, insight, and metrical facility. An enlarged edition appeared in 1890. In 'Plain Tales from the Hills' (1887) he gave the public the first collection of the striking and characteristic stories of English life under Indian conditions, on which his reputation chiefly rests. It was followed by 'The Phantom Rickshaw' (1889), including 'The Man Who Would be King'; 'Soldiers Three: Stories of Barrack-Room Life' (1890), "almost a classic in its way," whose heroes are a kind of latter-day "Trois Mousquetaires"; 'The Story of the Gadsbys' (1890);

'In Black and White' (1890), including eight tales; 'Wee Willie Winkie, and Other Stories' (1890), including 'The Drums of the Fore and Aft' and 'Under the Deodars' (1890). 'The Light that Failed' (1891) was his first attempt at sustained fiction. 'Life's Handicap: being Stories of Mine Own People' (1891), contains some of his best short stories, among them 'Without Benefit of Clergy.' His reputation was greatly enhanced by the publication in 1892 of 'Barrack-Room Ballads, and Other Verses,' including such poems as 'Fuzzy-Wuzzy'; 'Gunga Din'; and 'The Road to Mandalay.' To the same year belongs the rather unsuccessful novel 'The Naulakha: a Story of the West and East,' written with Wolcott Balestier. 'Many Inventions,' published in 1893, is a collection of 14 short stories, and the Jungle Book (1894), illustrated by his father and others, is partly in verse, partly in prose. Many regard this volume, with its beast-fables of a primitive India, as Kipling's best work. A 'Second Jungle Book' appeared in 1895, and in 1896 a volume of poems was issued under the title 'The Seven Seas, and Other Verses.' 'Captains Courageous' (1897) is a story of the Newfoundland cod banks, and 'The Day's Work' (1898) is a collection of 12 short stories, including 'The Bridge-Builders.' Among more recent works are 'Kim' (1901), whose hero is an agent in Indian secret service, a book in which "the last word upon native India seems to have been said"; 'The Just-So Stories' (1902), a clever juvenile; and 'The Five Nations' (1903), a collection of somewhat uneven verse. Of Kipling's occasional poems the most famous is 'The Recessional,' written on the occasion of Queen Victoria's Diamond Jubilee (1897). Kipling's best work must always rank high, but he is very unequal, and at times journalistic or mediocre. At his best, however, he is skilful in character-drawing, and his word-pictures are often extremely vivid. Consult: Clemens, 'A Ken of Kipling' (1899); Knowles, 'A Kipling Primer' (1900); Le Gallienne, 'Rudyard Kipling' (1900); Parker, 'The Religion of Kipling'; and many magazine articles.

Kip'per, a kippered herring, that is one preserved by smoking or pickling. Anciently in Scotland the word signified a salmon taken after the spawning season, and split, salted and dried, because of its inutility when fresh.

Kiral'fy, Imré, organizer and manager of spectacular exhibitions: b. Budapest, Hungary, 1 Jan. 1845. He commenced the composition of music at the age of 12; introduced many grand spectacular compositions in the United States 1869-94. His many productions include 'Venice'; 'Paris' (1902); 'Columbus'; 'Nero'; 'India'; 'America' (1893); 'Our Naval Victories' (1898); 'Women of All Nations' (1900); 'China, or the Relief of the Legations' (1901). Some of these tableaux and panoramas have had a success unexampled in the history of such undertakings.

Kirby, kér'bí, William, Canadian author: b. Kingston-upon-Hull, England, 13 Oct. 1817. He removed to Canada in 1832, but was educated in Cincinnati, Ohio. In 1839 he removed to Niagara, Ont., where he was editor and publisher of the 'Mail' for 20 years, and from 1871 to 1895 collector of customs there. He published 'U. E., a Tale of Upper Canada,' a poem

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1860); 'Le Chien d'Or,' a novel (1877); 'Pontiac' (1887); 'Annals of Niagara' (1896); etc.

Kirchbach, Wolfgang, völ'gäng kir'bäh, German critic and poet: b. London, England, 18 Sept. 1857. He was the son of a German artist and studied in Dresden and Leipsic. Settling in the former city in 1888 he was editor of the 'Magazin für Litteratur des In und Auslandes,' but from 1896 has lived in Berlin. Among his works may be cited: 'Märchen' (1879); 'Salvator Rosa,' a romance (1880); 'Gedichte' (1883); 'Das Leben auf der Waltz' (1892); 'Die letzten Menschen,' a drama (1892).

Kirghiz, kir-géz', Kirghis, or Kirghiz-Kazaks, a widely-spread nomadic people of Asia, of Turkish-Tartar race, who inhabit the steppes that extend from the lower Volga and the Caspian Sea in the west to the Altai and Thian-Shan Mountains in the east, and from the Sea of Aral in the south to the Tobol on the north. The term Kirghiz, though applied by Europeans to the whole of these peoples, properly belongs only to the Kara-Kirghiz (Black Kirghiz, called also Burúts or Fruts). Those to whom Europeans give the name Kirghiz are called by the Asiatics Kazaks. The Kirghiz-Kazaks speak the Turkish dialect of the Uzbeks. In their physical type they belong to the Mongolian race. They profess the Mohammedan faith, though they do not practise polygamy. They are below the general average of European stature, and are remarkably healthy and vigorous. Their food is chiefly mutton and horse-flesh, with koumiss or fermented mare's milk, from which they extract an intoxicating spirit. Their dwellings consist of a hemispherical tent, the frame of which is of boughs, the covering of felt. Their manufactures are exclusively domestic, and consist of woolen cloths, felt, carpets, hair-ropes, leather, metal ornaments for horse-trappings, knives, etc. They carry on a trade by barter with the Chinese and Russians, exchanging sheep, horses, camels, cattle, wool, skins, etc., for tea, cutlery, silks, and other manufactured goods. A considerable portion of the Kirghiz dwell in Chinese territory, for the most part in Turkestan, but the greater number of them are nominally under Russian dominion. Of those European Russia contains 150,000.

Kirk, kérk, Edward Norris, American Congregational clergyman: b. New York 14 Aug. 1802; d. Boston 27 March 1874. He was graduated at Princeton (then the College of New Jersey), in 1820, studied law in New York, was graduated from the Princeton Theological Seminary in 1824, was agent for the Board of Foreign Missions in the Southern States, was ordained in 1827, in 1828-37 was pastor of the Fourth Presbyterian Church of Albany, N. Y., and there established with N. S. S. Beman a school of theology. From 1842 until his resignation in 1871 he was pastor of the Mount Vernon Congregational Church of Boston. In 1856 at the request of the American and Foreign Christian Union he inaugurated regular worship for American Protestants in Paris. He was president of the American Missionary Association, and published 'Sermons' (1840; 1860); 'Lectures on Christ's Parables' (1856); and other writings.

Kirk, Ellen Warner Olney, American novelist: b. Southington, Conn. 6 Nov. 1842.

She was educated in Stratford, Conn., and was married to John Foster Kirk (q.v.) in 1879. Her novels have been popular, and among them are: 'Lost in Idleness' (1877); 'A Midsummer Madness' (1884); 'The Story of Margaret Kent' (1886); 'Sons and Daughters' (1887); 'A Daughter of Eve' (1889); 'Walford' (1890); 'The Story of Laurence Garthe' (1895); 'Dorothy Deane' (1899).

Kirk, John Foster, American historian: b. Fredericton, N. B., 22 March 1824. He removed to the United States in 1842 and settled in Boston, where he was for 11 years secretary to the historian Prescott, whose complete works he has edited. In 1870 he removed to Philadelphia, where he was editor of 'Lippincott's Magazine' till 1886; and lecturer on history in the University of Pennsylvania, 1885-8. He is the author of 'History of Charles the Bold' (1863-8); and editor of the 'Supplement' to 'Allibone's Dictionary of Authors' (1891).

Kirkbride, Thomas Story, American physician: b. near Morrisville, Bucks County, Pa., 31 July 1809; d. Philadelphia 16 Dec. 1883. He received the degree of M.D. from the University of Pennsylvania in 1832, and was appointed resident physician of the Friends' lunatic asylum at Frankford, Pa. A year later he was elected resident physician of the Pennsylvania hospital, in which he continued two years, when he began general practice in Philadelphia. In January 1841 he became superintendent of the Pennsylvania Hospital for the Insane, then first opened, and continued in that office till his death. He published 'Rules and Regulations of the Pennsylvania Hospital for the Insane' (1850), which has been a text-book and guide in the regulations of new hospitals; and a work 'On the Construction, Organization, and General Management of Hospitals for the Insane' (1854, enlarged 1880). In 1853 he proposed the erection of a new hospital, and the separation of the sexes in two distinct buildings, and was the first superintendent in the United States to carry such an arrangement into effect.

Kirkdale Cave, in Yorkshire, England, 28 miles west of Scarborough, is famous for the numerous remains of Tertiary mammals. It was discovered in 1821, in the cutting back of an oolitic limestone rock in which it is situated. Its greatest length is 245 feet. The fossil bones are contained in a deposit of mud that lies on the floor of the cave. The remains of the following animals have been discovered: hyena, tiger, bear, wolf, weasel, elephant, rhinoceros, hippopotamus, horse, ox, deer, hare, rabbit, water-rat, raven, pigeon, lark, and duck.

Kirke, Sir David, English adventurer: b. Dieppe, France, 1596; d. Ferryland, Newfoundland, 1656. The "merchant adventurers" of London were at the beginning of his life a powerful body of associated privateers, and his father, Gervase Kirke, a dealer in French wine, who had left France to escape from the perils of the religious wars, joined the adventurers and projected with Sir William Alexander a plan for capturing New France and colonizing Nova Scotia. They obtained letters of marque and a monopoly of the fur trade, and David Kirke sailed in 1627 as commodore of three privateers, his brothers, Lewis and Thomas, being each in command of one. Off Quebec, they captured 20

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French ships with cargoes and passengers. In 1629 he captured another vessel and compelled Champlain to surrender Quebec. In the meantime peace had been made with France, the captured territory was restored, but Kirke was knighted for his services. He seemed doomed to disappointed ambition to the end, for Cromwell's council revoked, after the execution of Charles I., the grant of all Newfoundland made to Kirke by the king, although the adventurer eventually recovered some portion of the lands thus confiscated.

Kirkland, Caroline Matilda Stansbury, American author: b. New York 12 Jan. 1801; d. there 6 April 1864. In 1827 she married William Kirkland, a professor in Hamilton College, Clinton, N. Y., removing with him to Michigan in 1839. She lived for a few years a pioneer life and her experiences furnished the basis of her earlier books published under the pseudonym, "Mary Clavers." These include: "A New Home; Who'll Follow?" her best work (1839); "Forest Life" (1844); and "Western Clearings" (1846). In 1842 she made her home in New York, where she established a boarding school for girls and contributed frequently to periodicals. Among her later works are: "The Helping Hand" (1853); "Memoirs of Washington" (1857); "The Destiny of Our Country" (1864).

Kirkland, James Hampton, American educator: b. Spartanburg, S. C., 9 Sept. 1859. He was graduated from Wofford College (Spartanburg, S. C.) in 1877, was assistant professor of Latin and Greek there in 1881-2, and professor of Latin and German in 1882-3. After European study (1883-6), he was professor of Latin in Vanderbilt University (Nashville, Tenn.) in 1886-93, and in 1893 became chancellor and professor of Latin language and literature. He wrote several monographs, and published a "Study of the Anglo-Saxon Poem called by Grein "Die Höllenfahrt Christi"" (1885), and an edition of the "Satires and Epistles of Horace" (1893).

Kirkland, John Thornton, American Unitarian clergyman and college president: b. Little Falls, N. Y., 1770; d. Boston 26 April 1840. He was the son of Samuel Kirkland (q.v.), was graduated at Harvard College in 1791, and ordained pastor of the Congregational (Unitarian) Church in Summer Street, Boston, in 1794, where he remained till elected president of Harvard College in 1810. He held this office until 1828. His "Life of Fisher Ames" (1800) is perhaps the most valuable of the several biographies of which he was the author, and his "Eulogy of General Washington" was much admired. He exerted a very great influence during his life, by the force of his intellect and character, and during his presidency the college flourished, both in its internal condition and in its external relations.

Kirkland, Joseph, American novelist: b. Geneva, N. Y., 7 Jan. 1830; d. Chicago 1894. He was a son of Caroline Kirkland (q.v.) and made his home in Illinois after 1856. During the Civil War he served in the Federal army, attaining the rank of major, and after engaging in coal mining for a time, practised law in Chicago. He published: "Zury, the Meanest Man in Spring County" (1887), a faithful story of the beginning of pioneer life in Illinois; "The

McVees" (1888); "The Captain of Company K" appeared in 1891; "The Chicago Massacre of 1812" (1893); "The Story of Chicago" (1892-4).

Kirkland, Samuel, American missionary to the Indians: b. Norwich, Conn., 1741; d. 1808. He was graduated at Princeton 1765. He had previously visited the Senecas, for the purpose of studying their language. In 1766 he was ordained, and sent by the Congregational Church to preach to the Indians. After living among the Senecas for a year and a half he went to the Oneidas, whom he considered to be the highest type of the Iroquois. During the Revolution he persuaded the Oneidas and Tuscaroras, who were bent on taking one side or other, to join the Americans, instead of the British. He saw considerable war service as military chaplain, especially with General Sullivan on the Susquehanna, in 1779. In 1793 he founded the Hamilton Oneida Academy for the education of Indian boys. This is now known as Hamilton College. In 1804 the Indians made complaints concerning his administration, and he published a vindication, which with his letters and journals, furnishes a unique picture of life among the Iroquois. Consult: Lothrop, "Life of Samuel Kirkland" (1848).

Kirk'man, Marshall Monroe, American railway official: b. Illinois 10 July 1842. He entered the railway service of the Chicago & Northwestern line in 1856, held various posts in different departments, was comptroller in 1881-9, and in 1889 became second vice-president. His chief works are: "The Science of Railways" (1894); "The Classical Portfolio of Primitive Carriers" (1896); "The Air Brake" (1901); "Building and Repairing Railways" (1901); "The Romance of Gilbert Holmes" (1900).

Kirkpatrick, Sir George Airey, Canadian statesman: b. Kingston, Ontario, 13 Sept. 1841. He was graduated with honors at Trinity College, Dublin, in 1861, studied law and was called to the bar in 1865. He succeeded his father as representative of Frontenac in the Dominion Parliament and sat from 1870 to 1891, when he was made lieutenant-governor of Ontario. He retired from this office in 1897.

Kirksville, kérks'vīl, Mo., city and county-seat of Adair County, on the Omaha, K. C. & E., and the Wabash R.R.'s; 204 miles northwest of Saint Louis. It was first settled in 1840, and under a charter of 1893 is governed by a mayor and city council elected biennially. There is a normal school here, court-house, public library and numerous churches. It lies in the centre of an extensive agricultural district and has manufactures of iron, wagons, carriages, etc. Pop. (1890) 3,510; (1900) 5,960.

Kirkus, William, American Episcopal clergyman: b. Yorkshire, England, 9 May 1830. After 16 years spent in the Congregational ministry in London he came to this country and entered the Episcopal ministry in 1871. He was for many years prior to 1892 rector of St. Michael and All Angels Church, Baltimore. He has published: "Christianity, Theoretical and Practical" (1854); "Miscellaneous Essays, Critical and Theological" (1863); "Orthodoxy, Scripture and Reason" (1865); "Religion: a Revelation and a Rule of Life" (1886).

Kirkwood, kerk'wud, Daniel, American educator: b. Bladensburg, Md., 27 Sept. 1814;

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d. Riverside, Cal., 11 June 1895. In 1851 he became professor of mathematics in Delaware College, of which he was president in 1854-6; and in 1856-86 was professor of mathematics in Indiana University, save for the interval 1865-7, when he was professor of mathematics and astronomy in Washington and Jefferson College. He contributed largely to scientific journals, and published the volumes: 'Meteoric Astronomy' (1867); 'Comets and Meteors' (1873); and 'The Asteroids or Minor Planets between Mars and Jupiter' (1887).

Kirkwood, Samuel Jordan, American statesman: b. Harford County, Md., 20 Dec. 1813; d. Iowa City, Iowa, 1 Sept. 1894. Having removed to Richland County, Ohio, in 1835, he studied law, was admitted to the bar in 1843, in 1845-9 was prosecuting attorney of the county, and in 1850-1 a member of the State Constitutional convention. In 1855 he established himself in milling and farming in Iowa, the next year was a member of the State senate, and in 1860-4 Republican governor of Iowa. During the Civil War he levied 48 regiments of volunteers and equipped them at \$500,000 less than the usual cost. He was United States Senator in 1865-7 (completing the unexpired term of James Harlan, resigned), was again elected governor of Iowa in 1875, in 1877-81 was a member of the Senate, and from 5 March 1881 to 6 April 1882, when he resigned, was secretary of the interior in Garfield's cabinet. He then withdrew from political life.

Kir'mess. See KERMESS.

Kirtland, kér'tländ, Jared Potter, American physician and educator: b. Wallingford, Conn., 10 Nov. 1793; d. Cleveland, Ohio, 10 Dec. 1877. He studied in the medical department of the University of Pennsylvania and was graduated from that of Yale in 1815; practised at Wallingford (1815-18) and Durham (1818-23), Conn., from 1823 at Poland, Ohio; in 1829-32 and 1834-5 was a member of the Ohio legislature; and was professor of the theory and practice of medicine in the Ohio Medical College (Cincinnati) in 1837-42. In 1843 he assisted in founding the medical department of the Western Reserve University, where he was professor of the theory and practice of medicine in 1843-64. He assisted in founding and became president (1845) of the Cincinnati Academy of Sciences, from 1865 the Kirtland Society of Natural History.

Kiser, Samuel Ellsworth, American journalist: b. Shippensburg, Pa., 2 Feb. 1862. He engaged in journalism as a reporter, in 1896 contributed special sketches to the Cleveland *Leader*, and is now (1903) on the editorial staff of the Chicago *Record-Herald*. He is the author of 'Budd Wilkins at the Show and Other Verses' (1898); 'Georgie' (1890); 'Love Sonnets of an Office Boy' (1902).

Kishineff, késh-e-néf', Russia, the capital of the government of Bessarabia, 86 miles northwest of Odessa, on the Byk, an affluent of the Dniester. It is a bishop's see, is well laid out on a picturesque site, and among its educational institutions are a seminary for priests, two gymnasias, a public library, and botanic garden. The grapevine and tobacco are cultivated in the vicinity; it has extensive manufactures of woollens; and a considerable commerce with the

East. Kishineff arose around the monastery of Kishnosaref in the 15th century. During the 18th century it was subjected to attacks from the Turks and in 1812 was annexed by Russia. It came into world-wide prominence in 1903 owing to a shocking massacre of Jews on the Russian Easter and succeeding days. Pop. (1897) 108,796, consisting of Russians, Moldavians, Jews, Bulgarians, Wallachians and Tatars.

Kishon, kí'shón, the biblical name of a river in Palestine. It is called El-Mukatta by the modern Arabs. Here Elijah slaughtered the priests of Baal, and Deborah and Barak defeated Sisera. The French and Turks fought a battle on its banks in 1799.

Kiss, an affectionate salute by contact of the lips. This is one of the most natural expressions of human affection, although often objected to now on sanitary grounds. The child expresses its love by a kiss, and men in all stages of refinement do the same. The word in Hebrew for 'kissing' is the usual expression to signify adoration; and the Latin *adoratio* literally means touching with the mouth. With some nations, as the Germans and French, it is customary for men to kiss each other after a long absence, etc. Kissing the hand of the sovereign forms part of the ceremonial of some European courts. Kissing the foot is a common oriental sign of respect. The later Roman emperors, whose court ceremonial was mixed with so many servile customs, first introduced this practice into the West. The popes of the Roman Catholic Church have required it as a sign of respect from the secular power since the 8th century. Pope Constantine I. first had his foot kissed by the Emperor Justinian II. on his entry into Constantinople in 710. Valentine I., about 827, required every one to kiss his foot; and from that time this mark of reverence appears to have been expected by all popes. When this ceremony takes place the pope wears a slipper with a cross, which is kissed. In recent times non-Catholics have not been obliged to kiss the pope's foot, but merely to bend the knee slightly. Even Roman Catholic princes sometimes perform only the genuflexion. When the pope is elected he is placed on the altar, and the cardinals, first of all, perform the adoration. Each approaches the newly-elected pope and kisses his foot, then his knee, and is then embraced by the pope, and saluted on the cheek.

Kissimmee', Fla., city and county-seat of Osceola County, on Tohopekaliga Lake; on the Florida Midland and the Plant system, 18 miles south of Orlando. It has extensive fruit and vegetable interests and is well known as a hunting and fishing resort. The headquarters of the cattle raising industry of the State are here. Pop. (1890) 1,080; (1900) 1,132.

Kissing-bug. See CONE-NOSE.

Kis'singen, a celebrated watering-place in Bavaria, on the Saale, 30 miles north of Würzburg. It is surrounded by walls flanked with towers, and has a magnificent bathing establishment. The springs, five in number, and all saline, contain a large quantity of carbonic acid gas, are used both internally and as baths, and are considered efficacious in gout and affections of the stomach and chest. Besides 10,000 visitors annually attracted by the baths, about 500,000

KISTNA — KITCHIN

bottles of water are annually exported. Pop. (1895), 4,306; (1900), 4,757.

Kist'na, a river of India, which separates the Deccan from southern India. It rises among the Western Ghâts, in the province of Bijapur, 42 miles from the Malabar coast, passes through Haidarabad, where it receives the Bhema on its left, and the Tungabudra on its right bank, both flowing, like it, from the Western Ghâts. Previous to the junction it is commonly called the Krishna, a name which is frequently given to the whole river. The united river falls into the Bay of Bengal. Its course is estimated at 700 miles. The Kistna is, perhaps, richer in gems than any other river of India. In the dry season diamonds, cat's-eyes, onyxes, and chalcedonies are said to be found, as well as a minute portion of gold.

Kit-Cat Club, a club formed in London about 1688, originally for convivial purposes, but which soon assumed a political character, having in the reign of Queen Anne become the resort of Marlborough, Walpole, Addison, Steele, and other leading Whigs. Its name was derived from that of Christopher Cat, who supplied the club with mutton-pies. The portraits (about three-quarters length) of the members were painted by Sir Godfrey Kneller, and hence a portrait of this length is called a "kit-cat." The club was dissolved about 1720.

Kit-fox, or **Swift-fox**, a small fox (*Vulpes velox*) found in the central and northwestern parts of the United States, and especially common in the upper Columbia River region. It is about 20 inches long, with a broad, short face, and has the soles of the feet densely hairy. In summer its fur is of a brownish gray color, tinged with orange on the flanks and white below; in winter it becomes much paler. It is especially noted for its activity, and for the deep burrows which it digs, and in which its young are born and nurtured. It feeds mainly on ground squirrels and small birds.

Kitchen Cabinet, a popular name applied to certain intimate political friends of President Andrew Jackson, who were supposed to have more influence over his actions than his official advisers. They were: General Duff Green, editor of the *United States Telegraph* at Washington, the confidential organ of the administration; Major William B. Lewis, of Nashville, Tenn., second auditor of the treasury; Isaac Hill, editor of the *New Hampshire Patriot*, and Amos Kendall (q.v.) of Kentucky. He was leader of the kitchen cabinet; worked for the Jackson "second choice" movement in Kentucky; and received the office of fourth auditor of the treasury. He was a man of exceeding ability, but of low moral perceptions, and, as a politician, was the incarnation of the worst evils of the American system. Harriet Martineau wrote of him, "I was fortunate enough once to catch a glimpse of the invisible Amos Kendall, one of the most remarkable men in America. He is supposed to be the moving spring of the whole administration."

Kitchen-middens, or **Kjökkenmöddings**, mounds of shells, bones, charcoal, and refuse, remaining upon the site of prehistoric settlements along the coasts of seas, lakes, and rivers in many parts of the world. The exploration of

them has brought to light many relics of the Palæolithic and Neolithic men who formed them, and contributed greatly to the knowledge of prehistoric archaeology. Extensive deposits of this kind occur in various parts of the United States, where they are known as shell-heaps (q.v.); and their formation is going on wherever savage conditions still exist.

Kitchener, kich'é-nér, **Horatio Herbert, 1st Viscount Kitchener of Khartum**, English general: b. near Ballylongford, County Kerry, Ireland, 22 Sept. 1850. He was educated at the Royal Military Academy, Woolwich, and entered the Royal Engineers as a lieutenant in 1871, having already seen some active service on the French side in the Franco-Prussian war. In 1874-8 he was engaged on the survey of Palestine under the auspices of the Palestine Exploration Fund Committee, and in 1878-82, except for a short period as vice-consul in Anatolia, carried out a survey of Cyprus. In 1882 he was appointed to a cavalry command in Egypt, served in the Nile expedition of 1884-5, and for his services was made a brevet lieutenant-colonel and received the Khedive's star and the second class Medjidie. He was governor of Suakin 1886-8, and distinguished himself in the latter year by the bravery and skill with which he led the Egyptian troops against Osman Digna at Handoub. In 1889 he was in command of mounted troops on the Sudan frontier, and for his bravery, was created a Companion of the Bath. From 1888 till 1892 he was adjutant-general and second in command of the Egyptian army, and in 1892 became Sirdar. He commanded the Anglo-Egyptian force which recovered Dongola for Egypt in 1896, and his services were rewarded by promotion to the rank of major-general. He was also made K.C.B. and awarded the first-class Osmanieh order. He utterly destroyed the power of the Khalifa by the battle of Omdurman on 2 Sept. 1898, and for this crowning triumph was raised to the peerage (1898) as Baron Kitchener of Khartum and of Aspall, in the county of Suffolk, receiving also the formal thanks of Parliament and a grant of £30,000. He was appointed governor-general and commander-in-chief of the Egyptian Sudan in 1899, but resigned this post and that of Sirdar of the Egyptian army in the latter part of the same year, in order to accompany Lord Roberts to South Africa as chief of his staff in the war with the Boers. When Lord Roberts left South Africa to become commander-in-chief at home, Kitchener succeeded him as commander-in-chief of the forces in South Africa, and carried on the war to its successful conclusion with the acceptance of peace conditions by the Boers on 31 May 1902. He was now created viscount and appointed commander-in-chief in India in the same year. Consult: Steevens, "With Kitchener to Khartum" (1898).

Kitch'in, George William, English historian and clergyman: b. Hadleigh, Suffolk, 7 Dec. 1827. He was educated at Oxford, took orders in the English Church, and was prominent as tutor and lecturer at the university for many years. He became dean of Winchester in 1883 and in 1894 was translated to the deanery of Durham. He is widely known by his "History of France," a standard work (1873-7); but has also published "Winchester" in the "Historic Towns" series (1890); "Life of Harold

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Browne, Bishop of Winchester' (1895); 'Life of Pope Pius II.' (1881); etc.

Kitchiner, William, English physician and author: b. London 1775; d. there 1827. He inherited a handsome fortune, was educated at Eton, obtained the degree of M.D. from Glasgow, and settled in London. He treated eating and drinking as the only serious business of life; and having caught the attention of the public by singularity of conduct, proceeded to promulgate, under the title of 'The Cook's Oracle,' the laws of the culinary art, professedly founded on his own practice. Besides his 'Cook's Oracle' (or 'Apicius Redivivus'), Kitchener wrote 'Practical Observations on Telescopes,' etc. (1815); 'Peptic Precepts' (1821); 'Art of Invigorating and Prolonging Life' (1822); 'Brief Memoir of Charles Dibdin' (1823); 'The Economy of the Eyes' (on spectacles, telescopes, etc., 1824-5); 'Traveler's Oracle' (1827); etc.

Kite, a small or medium sized bird of prey, of the falconine subfamily *Milvinae*, distinguished from the other hawks by the more or less forked tail, long, pointed wings, absence of facial ruff, generally weak build and certain skeletal peculiarities. Four species occur in the United States, their proper homes being southward and in the interior; but owing to their great powers of flight they occasionally stray to other parts or rarely cross the ocean to Europe. The swallow-tailed kite (*Elanoides forficatus*) is a beautiful bird, with all the grace, figure, and capacity for flight of a gigantic swallow, and is especially prone to wander widely from its home in the lower Mississippi Valley. The remaining three are the white-tailed kite (*Elanus leucurus*), the Mississippi kite (*Ictinia mississippiensis*), and the everglade kite (*Rostrhamus sociabilis*). The last is common in Florida and southward, and has the habits of a marsh-hawk. All of the kites feed largely upon insects and small reptiles, but capture weak birds and mammals also. They nest in trees and bushes. In common with other small hawks the kites have the habit of pausing during flight suspended in mid air, in imitation of which the common paper toy is said to have been constructed and named. When falconry was in vogue in Europe the native species of kite served as the quarry in the most highly developed branch of that sport. The group is more familiar in the warm parts of the Old World than in America.

Kite, a common aerial toy in the form of two crossed sticks covered with paper, and balanced with a tail of string, on which are tied bits of cloth or paper. Kites were first employed in aid of science in 1749, by Dr. Alexander Wilson and Thomas Melville, of Scotland, who by means of a thermometer attached to a kite were able to take temperatures above the earth's surface. Franklin's experiments with electricity by means of a kite and key are familiar to everyone. Among the men who have given much thought and labor to improve kite making are W. A. Eddy, S. P. Langley, Octave Chanute, Lawrence Hargrave, J. B. Millet, J. W. Davis, C. F. Lamson, H. D. Wise, Captain Baden-Powell, and others. The first improvement was to make a tailless kite, and this was perfected by Mr. Eddy. (See **AERODROME**; **FLYING MACHINE**.)

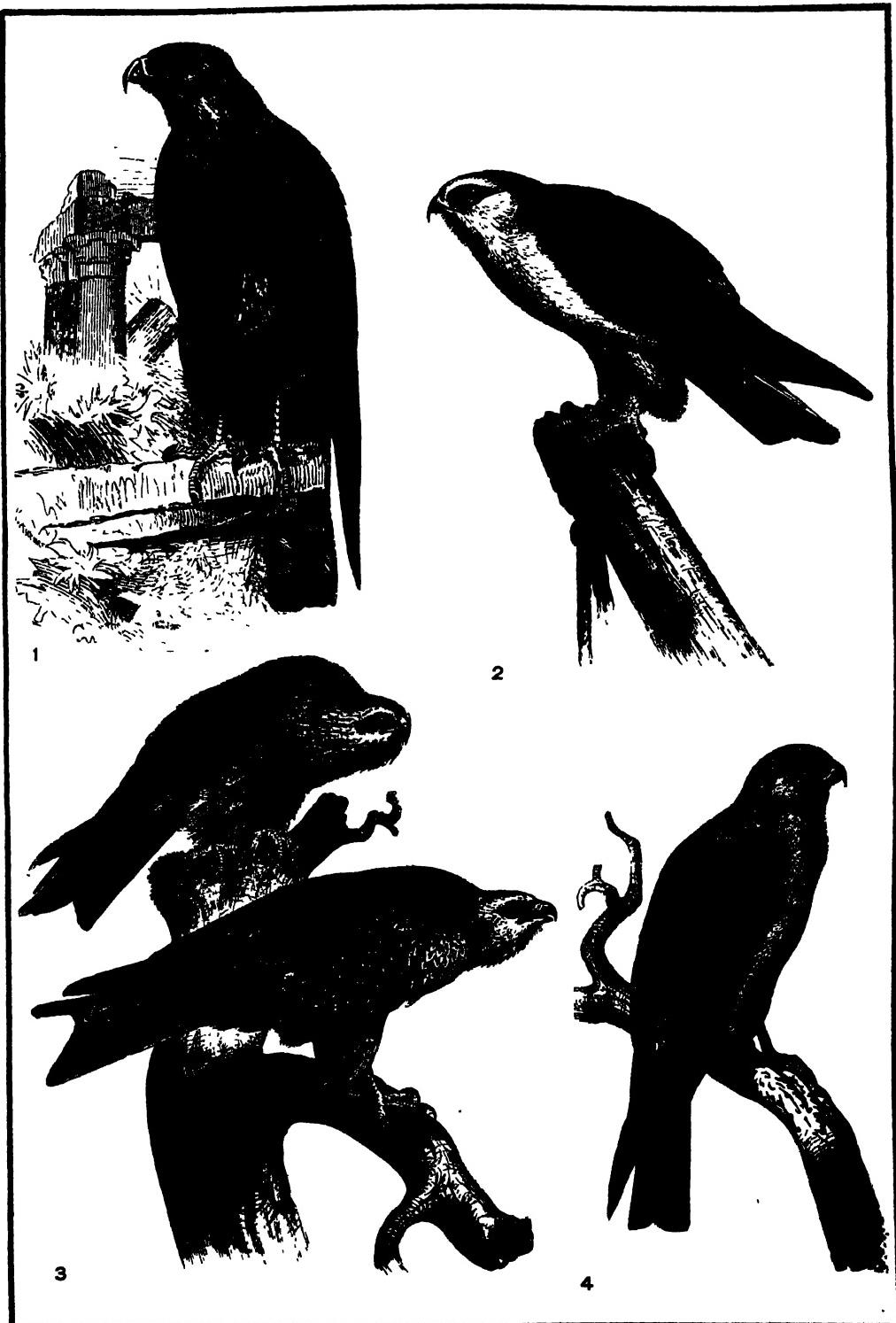
In 1895 Captain Baden-Powell, of England, weighing 150 pounds, was enabled to hoist himself 100 feet in the air by a tandem of five kites. Mr. Hargrave, with three kites, raised a total weight of 208 pounds to the height of 16 feet, as far as he cared to go. Lieutenant Wise, in 1897, with four kites, rose to 42 feet, the entire weight raised being 229 pounds. Mr. Eddy has done much to develop tandem kite flying. In 1897 he made a tandem of nine Eddy-Malay kites on a cord two miles long, with an elevation of 5,595 feet, the same being kept up for 15 hours. At Blue Hill Observatory, near Boston, this height was exceeded, the tandem of seven Malay and two Hargrave kites, with an area of 170 feet, rising 8,740 feet above Blue Hill, or 9,375 feet above sea-level. It took three miles of piano-wire and the work of three men for 12 hours to accomplish this feat. Piano wire has been found preferable to cord, having greater tensile strength and presenting less surface to the wind.

In the United States weather bureau para-kites are used for the purpose of recording the velocity of the wind, and the humidity and temperature at high altitudes, by the meteorograph. These can be obtained at a single observation and several hours before the effects are known in the lower atmosphere. Photographs have been taken by means of a camera fastened on the frame of a kite and operated by a cord, and Mr. Eddy has an arrangement of eight cameras strapped together in which all the shutters can be opened at once, and by this means a complete view of the horizon can be taken. Inventors of flying and soaring machines have made extensive use of kites in planning the construction of their various contrivances.

The first permanent station for kite flying in Europe, and the first in the world established under governmental auspices, is that at Viborg, in the extreme northern part of Denmark, the governments of Denmark, Sweden and France co-operating in the scheme. The most important building at the station is a tower 33 feet high, mounted on circular rails, so that it can be rotated easily, and left open on one side. No matter from which direction the wind blows, the tower is turned with this gap to leeward. Thus the operator can sit within, where the windlasses are, and watch his kites. The latter, of course, naturally take their lines down the wind. There are two windlasses, controlled by electric motors, one being held in reserve for immediate use in case the wire on the other breaks while in service.

Kites in War. Scientific kite flying has become a part of military tactics among European nations. Since kites have been modified and improved, their use has been continually extended, until now they are employed for quite a number of purposes, such as for signaling to a long distance or for locating the position of a camp; for obtaining a photograph of hostile country or of an enemy's fort by suspending a camera from the kite line and operating it by electric wire or clockwork; for making meteorological observations with self-recording instruments, and for lifting men for making reconnaissances. Kites offer great advantages over captive balloons in that they are more easily transported, are less expensive, and can be used in a strong wind.

KITES.



1. Black-winged Kite.
2. Egyptian Kite.

3. Black Kite and Common Kite.
4. Mississippi Kite.

KITSON — Klapka

Kit'son, Henry Hudson, American sculptor: b. Huddersfield, England, 1865. At Paris, he studied at the Ecole des Beaux Arts, under Bounaissieux. He was awarded three gold medals, by the Massachusetts Charitable Mechanics' Association; a gold medal of honor by the American Art Association of New York. He received a medal at the Universal Exposition, Paris, 1889, as well as that in 1900.

Kittanning, Pa., borough and county-seat of Armstrong County, on the Allegheny River and the Allegheny Valley railroad, 43 miles north of Pittsburgh. There is natural gas here and coal and iron ore are found in large quantities in the neighborhood. It has extensive iron and steel mills, foundries, lumber and flour-mills, potteries, brick and clay works, and other industries. Pop. (1890) 3,090; (1900) 4,000.

Kittatinny (kit'a-tin-i) Mountains, a range which extends from Ulster County south and southwest, through the northwestern part of New Jersey and into Pennsylvania. The names by which the range is generally known are in New York, the Shawangunk, in New Jersey, the Kittatinny, and in Pennsylvania the Blue Mountains. The range varies in height from 500 to 1,800 feet. The mountains belong to the Appalachians, and form the eastern ridge of the main part of the system.

Kittery, kit'e-ri, Maine, town in York County, on the Piscataqua River and the Boston & Maine railroad; 4 miles from the Atlantic Ocean, opposite Portsmouth, N. H. The United States Naval Station and Ship-building Yards are located here on Corifincut Island, but are known as the Portsmouth Navy Yard. The town is one of the oldest in New England. It was settled in 1624 and incorporated in 1647. It was the birthplace and former home of Sir William Pepperell. There are numerous hotels and churches here, public schools and the Rice Public Library containing 5,000 volumes. Pop. (1890) 2,864; (1900) 2,872.

Kittim, or **Chittim**, a term of Biblical origin for the inhabitants of the island of Cyprus, derived from the important town of Kition or Cition, the modern Lanarca. The "isles of Kittim" are mentioned in Jeremiah ii. 10, and Ezekiel xxvii. 6.

Kit'tiwake. See GULLS.

Kit'to, John, English Bible student: b. Plymouth, England, 4 Dec. 1804; d. Cannstadt, near Stuttgart, Germany, 25 November 1854. He was the son of a mason at Plymouth, and after obtaining a very scanty education began to assist his father, but met with a fall which deprived him of the sense of hearing. Sent to the workhouse he was presently apprenticed to a shoemaker, who used him so cruelly that the magistrates canceled his indentures. He therefore returned to the workhouse, and there, notwithstanding his physical defect, turned his talents to such account that in 1825 he published "Essays and Letters," which attracted no little attention. Shortly afterward he went abroad in the suite of the British envoy at the Persian court, and from 1829-33 acquired that familiar acquaintance with the East which he afterward employed in his writing. He founded and edited the "Journal of Sacred Literature" (1848-53), and although a layman of the English Church received in 1844 the degree of D.D.

from Giessen. He published "The Pictorial Bible" (1835-8); "Pictorial History of Palestine" (1841); "Gallery of Scripture Engravings" (1841-3); "Cyclopaedia of Biblical Literature" (edited 1843-5); "The Lost Senses: Deafness and Blindness" (1845); "Physical Geography of the Holy Land" (1848); "Daily Bible Illustrations: Morning Readings" (1849-51); "Evening Readings"; etc. In his latter years he enjoyed a pension of £100 a year from the crown.

Kit'ton, Frederic George, English author and artist. After receiving his education at a private school in Norwich, he was put under the training of W. L. Thomas, managing director of the "Graphic," and became an expert draftsman and wood engraver. In 1882 he added literature to his profession of book illustration. Among his delightful appreciations of artists, illustrators and authors of his time may be mentioned "Phiz (Hablot Knight Browne)" a memoir (1882); "John Leech, Artist and Humorist" (1883); "Charles Dickens by Pen and Pencil" (1890); "Dickens and his Illustrators" (1898).

Kit's, Saint. See CHRISTOPHER, SAINT.

Kittul, ki-tool, or **Kittool**. See FIBRE.

Kiushiu, kyoo'syoo', or **Kyushu**, Japan, one of five large islands of the empire; area 13,788 square miles. It contains nine provinces but for administrative purposes is divided into seven *Ken* or prefectures. The island is mountainous and volcanic. The principal harbor is the treaty port, Nagasaki, but in 1889 five special ports of export were opened. Pop. 6,637,551.

Kiwi-kiwi, ke'wi-ke'wi. See APTERYX.

Kizil-Irmak, kiz'il-ir-mäk' (the Turkish for Red River) a river known to the ancients as the Halys, the principal river of Asia Minor. Rising in the east of the peninsula, it flows in a circuitous route for over 500 miles, and enters the Black Sea near Sinope.

Klamath, kla-mät, a name applied to several tribes of American Indians formerly living along the Klamath River in Oregon and California, but now settled on a reservation at Klamath Lake. Their present lands were given them by treaty in 1864, the reservation containing 1,300 square miles. The Klamaths who now number about 800 are fairly civilized and are expert stock-raisers.

Klamath Lake, a small lake in Klamath County, Oregon, at the base of the Cascade Range. It is 44 miles long by 6 to 14 miles wide. It consists of two considerable bodies of water, connected by a narrow strait less than two miles wide. Klamath River is the outlet, and issues from the south end, or Lower Klamath Lake, and flows thence into California.

Klapka, klöp'kö, Gyorgy (GEORGE), Hungarian general: b. Temesvar 7 April 1820; d. Budapest 17 May 1892. He entered the Austrian army in 1838 and rose to high rank, but in 1848, at the beginning of the revolution, joined the Hungarians and distinguished himself in nearly all the battles with the Austrians; in more than one the misfortune of the day was decided by the troops under his command. His most noted exploit was his defense of Komorn, which he continued to hold for some weeks after all the rest of Hungary had submitted.

KLEBER — KLONDIKE

He lived in exile till the amnesty of 1867 permitted him to return home, and then became a member of the Hungarian Diet. He published 'The National War in Hungary and Transylvania' (1851), one of the best works on the subject; 'The War in the East' (1855); 'Memoirs' (1869); 'Recollections' (1887).

Kléber, Jean Baptiste, zhōn bāp-tēst kläbär, French general: b. Strasburg 9 March 1753; d. Cairo, Egypt, 14 June 1800. He first studied architecture in Paris, then entered the military school at Munich; and having joined the Revolutionary army was appointed brigadier-general and sent to La Vendée. He afterward commanded the left wing of the army of Jourdan, directed both the passage of the Rhine at Düsseldorf and the subsequent retreat; defeated the Prince of Würtemberg, and subsequently Prince Charles Bonaparte entrusted the command of the army in Egypt to Kléber, who, deeming resistance useless, concluded the convention of El Arish with the British, by which the French were to be conveyed home with arms and baggage. This being disowned by the English government, Kléber determined upon the resubjugation of the country, in which he was successfully engaged when he was assassinated.

Klein, klin, Bruno Oscar, American composer and pianist: b. Osnabrück, Germany, 6 June 1858. He was graduated from the Gymnasium Carolinum in his native town and studied music at the Royal Music School at Munich. He came to the United States in 1878 and has since made his home in New York, where he is professor of music at the Convent of the Sacred Heart. He has published many songs and motets, a large number of compositions for the piano, and various other works. In 1895 his grand opera, 'Kenilworth,' was produced at Hamburg.

Klein, Felix, German mathematician: b. Düsseldorf 25 April 1849. He was educated at Bonn, became Plucker's assistant in the physical institute in 1866, was appointed lecturer at Göttingen in 1871, professor at Erlangen in 1872, and held chairs from 1875 in the Technical High-school of Munich, from 1880 at Leipsic, and from 1886 at Göttingen. In 1893 he represented Göttingen at the World's Columbian Exposition at Chicago. He exercised large influence on American mathematics, having taught many instructors in institutions in this country. Among his works are 'Ueber Riemanns Theorie der algebraischen Funktionen' (1882); 'Vorlesungen über das Ikosaeder und die Auflösung der Gleichungen vom fünften Grad' (1884); 'Einführung in die höhere Geometrie' (1893), and 'Evanston Colloquium' (1893).

Kleist, Heinrich Bernt Wilhelm von, hīn'rīkh bērnt vī'l'hēlm fōn kl̄st, German dramatist: b. Frankfort-on-the-Oder 18 Oct. 1777; d. Wannansee, near Potsdam, 21 Nov. 1811. He entered the army in 1795, but left it in 1799 to study at Frankfort and Berlin, and later engaged in journalism in Dresden and Berlin. His first drama, 'Die Familie Schroffenstein,' was published in 1803, and was followed by 'Amphytrion' (1807); 'Penthisilea,' a tragedy (1808); 'Käthchen von Heimbrown' (1810); 'Der zerbrochene Krug' (The Broken Jug) (1811). A volume of 'Tales' appeared (1810-11); and posthumously, 'The Battle of

Hermann,' and 'Der Prinz Von Homburg.' He exhibits some of the worst faults of the Romantic school, to which he belongs, but nevertheless his best plays, such as 'The Prince of Homburg' and 'The Broken Pitcher' possess sufficient vigor and fidelity to life to make them popular even at the present day. The best of his tales is 'Michael Kohlhaas,' a story of Brandenburg in the Middle Ages. He failed to gain recognition and shot himself, after first shooting a woman whom he loved, and who like him was weary of life. His works did not receive notice till after his death, when they were made known by Tieck.

Klephthes, kléfts (Greek, "thieves"), Greek bandits who kept themselves free in the mountains, and carried on a perpetual war against Turkish rule, considering everything belonging to a Turk a lawful prize. During the war of independence these Klephthes furnished the Greeks with some of their best soldiers and leaders. Whole tribes, as the Siliotes and Chimaariots in Epirus, and the Sphakiots in Crete, are to be numbered among them.

Kleptoma'nia (from Greek κλέψτειν, steal, and μανία, madness), a mania for stealing, a propensity often regarded as being irresistible and involving a kind of moral insanity. It is frequently pleaded in law courts as an excuse for theft, although the act constitutes a legal offense. See INSANITY.

Klinger, Max, German painter, etcher and sculptor: b. Leipsic 18 Feb. 1857. He was a pupil of Gussow at Karlsruhe and later at Berlin; studied also at the Berlin Academy; was active at Rome in 1888-92; and from 1893 in Leipsic. He was at first chiefly an etcher (1879-86), perhaps the best of his work in this sort being the 'Brahms-Phantasien' (1894), deriving their subjects from various music of that composer. Then he directed his attention to painting in oils, and executed heroic canvases of 'The Crucifixion' and 'Christ on Olympus.' One of the best of his plastic works is his polychromatic statue of Beethoven (Leipsic Museum), in which onyx, bronze, and differently colored marbles are combined. He published 'Malerei und Zeichnung' (3d ed. 1899).

Klip'springer, a small, robust antelope (*Oreotragus saltator*), about equal in size to the chamois, and resembling it in habits, found in the mountainous districts of South Africa. It is yellowish-gray, and the hair is long, and makes a rough fur. The flesh of the klip'springer is particularly esteemed; the hair is also valued for stuffing saddles; and it has therefore become rare in localities where it was once common. The pinnacles and precipices in which it delights make hunting it with dogs impossible, but to get within rifle shot of it is not difficult. Many interesting habits are given by writers on South African zoology and natural history.

Kloet, a volcano on the island of Java. Although among the smaller of the numerous volcanoes there, it came prominently into notice on account of its eruption in May 1901, in connection with which, besides its destructive effects, there were peculiar atmospheric phenomena.

Klon'dike, The, a famous gold-bearing stream which enters the Yukon, the principal

KLOPSCH — KNAPP

river of the Northwest Territory, Canada, 45 miles below the mouth of Sixty Mile Creek. In recent years the term Klondike is applied to the region surrounding the river and its tributaries, which lies between Alaska and the British possessions. As early as 1862 gold was discovered in Alaska, but no special notice was taken of it; 13 years later gold was found at the head of the Stikine River. In 1880, Juneau, a Frenchman, with a companion started out from Sitka and traveling north discovered gold in a creek which they named Gold Creek, and at the mouth of this creek founded a town first called Harrisburg and later Juneau and which soon became the centre of mining supplies and a considerable fur trade. In 1886 a rich find was reported on Stewart River, in the Yukon district, and the following year an expedition was sent out by the Canadian government, headed by George M. Dawson, which explored the Upper Yukon and reported the existence of an abundance of gold. The difficulties and hardships to be encountered in reaching the location were so great that but a few hundred miners attempted to seek their fortunes there. These, however, persevered and established Circle City on the Alaska side of the boundary and by 1892 were taking out an annual total of about \$300,000.

It was not till 1897 that the wonderful riches of the Klondike region were made known through George McCormick, who went from Illinois to Alaska in 1890 and there married an Indian squaw. In 1897 he located at the mouth of the Klondike River for the purpose of salmon fishing, but this not proving profitable that season he in company with some Indians moved up the river till they came to Bonanza Creek, which they began to explore for gold. They found large quantities of paying dust and located an extensive claim. Going to the Indian village from which they came for supplies, the news of their find quickly spread, other claims were forsaken, some of the prosperous towns were deserted and miners from every direction poured into the newly found gold fields. Joseph Ladue, an old prospector and well-known miner, was one of the first to explore the country, and his statements gave an impetus to the steadily increasing stream of gold hunters.

Clarence Berry, a miner, returned to Juneau in the fall of 1897 on his way home to San Francisco with \$130,000 in dust which had been thawed and sluiced out of 30 box lengths of soil in a few weeks' time. And this is but one of many similar experiences, which aroused the wildest excitement all over the United States, with which the Californian "gold fever" of 1849 stands no comparison. All through the fall and winter of 1897 the mad rush for the Klondike region continued. The almost unknown towns of Juneau, Dyea and Skagway sprang into sudden prominence and rapidly added to their population, while Dawson City in which the first hut was built in September 1896, six months later had 500 houses, and in 1901 had grown to a prosperous city with handsome residences, hotels, banks, schools, churches and many modern improvements.

The Klondike is not far from the arctic regions, and for seven months of the year intense cold prevails, varied by furious snow storms which begin in September and occur at intervals till May. By 20 October ice is formed over all the rivers. The ground for the better part of the

year is frozen to the depth of from 3 to 10 feet, and the only way to get at the gold is to thaw the earth by building a fire and afterward break up the soil with a pick. When the warmer weather comes this is washed in running water which carries away the dirt and pebbles, leaving the gold at the bottom of the pan or sieve. Many nuggets of fine gold have been found varying in value from a few dollars up to a hundred. The amount of gold dust and nuggets taken out of the Klondike region within two months after the discovery was \$5,000,000, and up to the close of 1902 the entire output was estimated at \$30,000,000. See ALASKA.

Klopsch, klöpsch, Louis, American journalist and philanthropist: b. Germany 26 March 1852. As proprietor of the New York 'Christian Herald' he has instituted several extensive international charities. Since 1892 he has raised through his paper and distributed for the relief of human suffering over \$2,000,000. In 1892, during the Russian famine, he was received by the present Czar Nicholas II., and in 1898 President McKinley appointed him one of the commissioners to relieve the reconcentrados of Cuba. In 1900 he visited the famine fields of India; in 1901 Li Hung Chang by cable interested him in behalf of the starving people of Shensi, and in 1903 he visited the famine districts of the north of Europe, where he had audiences with the King and Queen of Sweden, Queen Alexandra of England, the Empress of Russia, and the King of Denmark. Since 1900 he is supporting and educating 5,400 famine orphans in India.

Klopstock, Friedrich Gottlieb, frē'dērīh götlēb klop'stok, German poet: b. Quedlinburg, Prussia, 2 July 1724; d. Hamburg 14 March 1803. He is widely famous as the author of the sacred epic, 'The Messiah,' the first three cantos of which were published in 1748. They excited general attention, and in consequence Klopstock was invited to Copenhagen by the minister Bernstorff, and offered a small pension. In 1764 he wrote his drama 'Hermanns Schlacht' (Battle of Arminius), and in 1771 left Copenhagen for Hamburg, under the character of Danish secretary of legation and counsellor of the margravate of Baden. In Hamburg he finished his 'Messiah' (1773). He also wrote 'Die Gelehrtenrepublik' (The Scholar's Republic) (1744), his chief work in prose; 'Geistliche Lieder' (1758); 'Oden' (1771); and several dramas, in addition to the one already named. His reputation was greater in his own day than has since been the case, but he is admitted to have done great service to German literature in assisting to free it from foreign, especially French influence. Consult: Lyon, 'Über Klopstocks Verhältniss zu Goethe' (1879); Lappenberg, 'Briefe von und an Klopstock' (1867).

Klotz, klōts, or Clotz, Matthias, Tyrolean violin-maker: b. about 1640; d. about 1696. He was a pupil of Jakob Stainer at Abson near Innsbruck, there established himself, and made violins much in Stainer's manner, so that only the less metallic tone of Klotz's instruments offers a distinguishing feature. His violins range in date from 1675 to 1696.

Knapp, năp, William Ireland, American educator: b. New York 10 March 1835. He

KNAPSACK — KNICKERBOCKER

was graduated from Colgate University, Hamilton, N. Y., and was professor of modern languages there, 1860-5. He held similar positions at Vassar College 1865-7; Yale 1879-92; and the University of Chicago 1892-5. He has since lived in Europe and has published 'Life of George Borrow' (1883); and several Spanish and French text-books; and has edited several Spanish authors as well as Borrow's 'Lavengro,' and 'Romany Rye' (1900).

Knap'sack, a bag or case of leather or strong cloth, used by soldiers, tourists, and other travelers for carrying light personal baggage. Knapsacks are made in various styles, and are usually strapped to the back.

Knapweed. See CENTAUREA.

Knaus, Ludwig, lood'vig knows, German painter: b. Wiesbaden 5 Oct. 1829. From 1845 to 1852 he studied art at Düsseldorf under Sohn and Schadow, but soon shook himself free from their influence and started on a path of his own. He chose scenes from country life and in 1850 painted 'The Country Dance'; 'The Players,' now in the gallery at Düsseldorf, a replica being in the gallery of Leipzig. His early pictures in this style were received with favor, although characterized by the dark, dull coloring of the Düsseldorf school. In 1852 he went to Paris, and resided there for eight years, which were fruitful in many well-known pictures of his early style, 'The Golden Wedding' (1858); 'The Baptism' (1859); and 'Starting for the Dance.' Returning to Düsseldorf in 1866, he remained there for eight years, during which period he produced the pictures on which his reputation as a genre painter is chiefly founded. Amongst these is 'The Child's Party' (1869), in the Berlin National Gallery; 'Funeral in a Hessian Village' (1871); 'The Goose-Girl' (1872). These works are distinguished by naturalness and naïveté, by delicate humor, mastery of detail, lifelike coloring and vivid expression. After his appointment to the direction of a studio in the Art Academy at Berlin he reached his latest manner, which was formed largely by his study of the Dutch school, from which he acquired his final skill as a colorist. His pictures, however, no longer showed the naïveté, the directness of his earlier productions; which were replaced by thoughtfulness and a striving after the didactic or admonitory. The most remarkable paintings of this period are 'The Holy Family' (1876); 'Tavern Scene—Bad Ways' (1876); 'The Refractory Model' (1877); etc. He has also painted many portraits combining the picturesqueness of genre with lifelike expression. Among his miscellaneous works are his designs in Watteau style for room decorations, his lead pencil sketches and aquarelles. Very many of his works have been reproduced by photography or engraving.

Kneeland, nē'lānd, Samuel, American naturalist: b. Boston, Mass., 1 Aug. 1821; d. Hamburg, Germany, 27 Sept. 1888. He was graduated from Harvard in 1840, practised medicine in Boston 1845-50, and was an army surgeon during the Civil War. In 1866 he became professor of zoology and physiology in the Massachusetts Institute of Technology. He was a member of numerous scientific societies, and in addition to editing 'The Annual of Scientific Discovery' (1886-9), a translation of 'Andry's Diseases of the Heart' (1847), and Smith's

'History of the Human Species,' wrote 'Science and Mechanism' (1854); 'The Wonders of the Yosemite Valley and of California' (1871); 'An American in Iceland' (1876).

Kneipp, knip, Sebastian, German clergyman: b. Stefansried, Bavaria, 17 May 1821; d. Worishofen, Swabia, 17 June 1897. He studied theology at Dillingen and Munich, became a Roman Catholic priest in 1852, and pastor at Worishofen in 1881. He became known for the 'Kneipp cure,' which he advocated for years. This method was based on water, fresh air, sunshine, and a scheme of regular activity, and included walking barefoot in dew-moistened grass and on snow. Kneipp wrote: 'Meine Wasserkur' (1887; Eng. trans. 1891); 'Mein Testament' (1894); 'Vortrage in Wörishofen' (1894-8); and other works.

Kneisel, nī'zēl or knī'zēl, Franz, German-American musician: b. Rumania 1865. He was a pupil in violin-method of Grun and Hellmesberger, became concert-master of the orchestra at the Hofburg Theatre of Vienna, of Bilse's orchestra at Berlin, and later of the Boston Symphony Orchestra. He appeared prominently with the Symphony as solo violinist, and organized under his leadership the Kneisel quartette for chamber-music, in which he played the first violin part. This quartette, all of whom were also members of the Symphony, withdrew from the latter in 1903 to undertake an extensive tour.

Kneller, nē'lēr, Sir Godfrey, originally GOTTFRIED KNILLER, Anglo-German portrait painter: b. Lübeck 8 Aug. 1646; d. Twickenham, England, 19 Oct. 1723. He studied under Bol and Rembrandt at Amsterdam. He visited Italy in 1672, and painted several historical pieces and portraits both at Rome and Venice. On his return he visited England, in 1675, and was introduced to Charles II., by whom he was much patronized. He was equally favored by James II. and William III., for the latter of whom he painted the "beauties" at Hampton Court, and several of the portraits in the Gallery of Admirals. He also painted the portrait of the Czar Peter for the same sovereign, who in 1691 knighted him, and made him gentleman of the privy chamber. Queen Anne continued him in the same office, and George I., in 1715, made him a baronet. He continued to practise his art to an advanced age. He left money and instructions for a splendid monument to himself in Westminster Abbey, erected by Rysbrick in 1729, which bears an epitaph by Pope. His coloring is true and harmonious, and his drawing correct, but he displays a great want of imagination in his pictures, the attitudes, action, and drapery being insipid, unvarying, and ungraceful. Many of the portraits bearing his name were only partly painted by himself, the less important portions being done by assistants.

Knickerbocker, nik'ēr-bōk-ēr, Herman, American lawyer and legislator: b. Albany, N. Y., 27 July 1782; d. Williamsburg, N. Y., 30 Jan. 1855. He studied law at Albany, N. Y., was admitted to the bar in 1803, and entered practice in Albany. In 1809-11 he was a Federalist representative from New York in the 11th Congress, in 1816 was elected to the New York State assembly from Rensselaer County, and for some time also held the office of county judge. He became a Democrat during Jackson's admin-

KNICKERBOCKER'S HISTORY OF NEW YORK — KNIGHTS OF HONOR

istration. Through his hospitality he was known as "Prince Knickerbocker."

Knickerbocker's History of New York, a celebrated work written by Washington Irving (q.v.). It gives picturesque description of the early burgomasters, the patroon Killian Van Rensselaer, Stoffel Brinkerhoof, William Kieft, called "William the Testy," Antony Van Corlear the trumpeter, Peter Stuyvesant with his silver leg, and a complement of Indians, Dutch, and Yankee settlers. "Before the appearance of my work," says Irving, "the popular traditions of our city were unrecorded; the peculiar and racy customs and usages derived from our Dutch progenitors were unnoticed or regarded with indifference, or adverted to with a sneer."

Knight, nit, Charles, English editor and publisher: b. Windsor 19 March 1791; d. Addlestone 9 May 1873. He succeeded his father as a bookseller in Windsor, and for several years edited a Windsor newspaper. Having removed to London in 1823, he established "Knight's Quarterly Magazine," in 1827 undertook the superintendence of the publications of the Useful Knowledge Society, for which he superintended and published the "Library of Entertaining Knowledge"; the "Penny Magazine" and the "Penny Cyclopaedia," afterward remodeled as the "English Cyclopaedia"; etc. Other publications of his were the "Pictorial Bible," the "Pictorial Prayer-book," "Pictorial Shakespeare," and many others. The Shakespeare was edited by Knight himself, and has, both for its text and notes, taken a high place among editions of the great dramatist. The most important of his own writings, the "Popular History of England," appeared 1854-61.

Knight, Daniel Ridgeway, American painter: b. Philadelphia, Pa., 1850. He has been a pupil of Gleyre and a student at the Ecole des Beaux Arts, at Paris (1872), and four years later was in the studio of Meissonier, from whom he learned many of the secrets of brilliant technique. He has received honors from Paris, Munich, and Antwerp for his exhibited works, and has also been awarded medals in his own country. He is a painter, rather French than American, and he has idealized the French peasantry in more than one of his refined and delicately designed pictures, among which we may mention as especially characteristic of his charming qualities "The Veteran" (1870); "The Old Beau" (1873); "Washerwomen" (1875).

Knight, Edward Henry, American mechanical expert: b. London, England, 1 June 1824; d. Bellefontaine, Ohio, 22 Jan. 1883. After studying both surgery and steel engraving he came to this country in 1845 and settling in Cincinnati was a patent attorney for seven years. In 1863 he entered the civil service in Washington, D. C., where he prepared the annual reports of the Patent Office and established the "Official Gazette of the United States Patent Office" in 1871. He served on the international juries of world's fairs at Philadelphia (1876), Paris (1878), Atlanta (1881), and was made a chevalier of the Legion of Honor in 1878. He published "The American Mechanical Dictionary" (1872-6); "The New Mechanical Dictionary" (1876-80).

Knight, Sarah Kemble, American author: b. Boston 19 April 1666; d. near Norwalk,

Conn., 25 Dec. 1727. In 1706-13 she conducted at Boston a school in which Samuel Mather and Benjamin Franklin were at one time pupils. By New England custom she was styled "Madam" Knight as a token of respect. Her "Journal Kept on a Journey from Boston to New York in the Year 1704" (1825) is a diary record evidently compiled from daily notes made on the way. It is valuable for its account of customs and manners and its descriptions of the settlements.

Knights of Columbus, a Roman Catholic fraternal, insurance organization for men; founded in 1882 in New Haven, Conn., by Rev. Michael J. McGivney. The order has as its basic principles, charity, unity, fraternity, and patriotism. For admission one must be 18 years of age, a practical Roman Catholic, and not engaged in the liquor business in any form. The headquarters are in New Haven, Conn., where they have a magnificent house, and business is transacted under a charter granted by the State of Connecticut. The local branches are called councils. Each State having four councils or over, with a membership of not less than 400, may form a State council. The national council is composed of delegates from the State councils. The national council elects the board of directors. Councils have been established in many parts of the United States and Canada and in the Philippines and Porto Rico. The report of 1 Jan. 1904 shows a membership of 103,000; 38,000 of whom are insured members. The reserve fund (belonging to the insured members) amounts to \$900,000; the net assets are over \$980,000. The per capita surplus for the insurance members is \$26.32.

Knights and Ladies of Honor, a fraternal beneficiary society founded in the United States in 1877. In 1902 it reported a membership of 63,000; benefits disbursed since organization, \$19,000,000. The benefits disbursed in 1902 amounted to \$1,173,000. The society has a Supreme Protector, 16 grand lodges and 1,160 sub-lodges.

Knights of the Golden Circle, a secret organization in the United States, established a few years before the Civil War, and formed with the object of destroying the Republic and setting up a great Southern empire with negro slavery as its cornerstone, and also with the purpose of controlling the great commercial interests of cotton, sugar, and tobacco. With its centre at Havana, Cuba, the "Golden Circle" intended to embrace in the territory of the new government a radius of 1,200 miles, and to include parts of Central America. The organization was never fully consummated, although thousands of persons joined in the movement and many lodges or councils were instituted.

Knights of the Golden Eagle, a secret society founded in the United States in 1873. It had in 1902, 15 grand castles, 800 sub-castles and 75,597 members. The benefits disbursed during 1902 amounted to \$231,794.

Knights of Honor, a fraternal benevolent society founded in the United States in 1873. Its membership in 1902 was reported at 62,173; benefits disbursed since organization, \$71,231,447, and during 1902 the amount was \$3,074,649. It has a supreme dictator, 36 grand lodges, and 1,918 subordinate lodges.

KNIGHTS HOSPITALLERS — KNIGHTS OF PYTHIAS

Knights Hospitallers. See HOSPITALLERS.

Knights of Labor, an American labor organization which originated among the garment-cutters of Philadelphia in 1869. It was founded by 10 members of the trade under the leadership of Uriah Stevens (q.v.), as a secret society, with a rather elaborate ritual. It grew slowly at first; though workmen of all trades were admitted, it was not until 1872 that the second local assembly was formed, but in that year 27 locals were organized, all in Philadelphia; the first local organized outside that city was that of the gold-beaters of New York. In its first organization politicians, physicians, lawyers, and liquor-dealers were excluded from membership; the two latter classes are still excluded. The first general assembly was held at Reading, Pa., in 1878, where seven States were represented. At this meeting a declaration of principles was adopted which remains substantially the same: the purpose was declared to be "the organizing, educating, and directing of the power of the industrial masses," in order to "make industrial and moral worth, and not wealth, the true standard of national and individual greatness," and to "secure to the workers the full enjoyment of the wealth they create." To secure these aims, the organization demanded certain legislative remedies, including the referendum, the establishment of a bureau of labor statistics, abrogation of class laws, prohibition of the employment of children under the age of 15, abolition of the contract system on public works, and of the convict-labor system, and reforms in the financial and land laws; and in the industrial field it proposed to "establish co-operative institutions which will tend to supersede the wage-system," to secure both sexes equal rights, and gradually to reduce the hours of labor to 8 per day. In 1881 all secrecy was abolished, and in 1882 a revised constitution adopted, in accordance with which the organization consists of local assemblies, of not less than 10 members, of whom three fourths must be wage-earners or farmers; district assemblies, formed by not less than five locals, and the general assembly, which meets annually for the election of officers and the transaction of business. The executive officers are a general master workman, general worthy foreman, general secretary-treasurer, and general executive board. The constitution provides also for the support of strikes approved by the executive board after all attempts at conciliation have failed. The organization grew rapidly after this time, till in 1886 delegates at the general assembly represented over 300,000; at that time, however, dissensions began which resulted in a split and the formation of the American Federation of Labor (q.v.). Though the organization remained powerful for several years, its numbers began to decrease, and in 1903 it reported only 40,000, and its influence gradually declined. In 1890 'The Journal of United Labor' was established; later the name was changed to 'Journal of the Knights of Labor,' and it is the official journal of the organization.

The Knights differ radically from the trades unions in the basis of their organization; their ideal is to organize labor without distinction of trade, and to harmonize individual and trade interests with the interest of the whole; though locals may be organized on trade lines, no

autonomy of trades is allowed. This and the fact that the general executive board tried to exercise a too centralized authority were among the chief causes of dissatisfaction. Strikes were at one time condemned by the general assembly (1880), but later the organization took part in a number of strikes and also made use of the boycott; violence has been at all times condemned. Consult: Mac Neill, 'The Labor Movement; the Problem of To-Day'; Powderly, 'Thirty Years of Labor'; Wright, 'Historical Sketch of the Knights of Labor' (in 'Quarterly Journal of Economics,' Vol. I., p. 137).

Knights of the Mac'cabees, a fraternal and benevolent association, founded in 1883, and numbering in the United States more than 294,000 members. It has a supreme commander, 6 grand tents and 4,300 subordinate tents and hives. It has disbursed in benefits since its organization \$14,159,246, and during 1902, the amount was \$2,178,124. All offices are located at Port Huron, Mich.

Knights of Malta, Ancient and Illustrious Order of, a secret society founded in Jerusalem, Turkey, and in the United States in 1889. There are now 5 grand commanderies, 233 sub-commanderies and 27,000 members. In 1902, benefits to the amount of \$40,000 were disbursed.

Knights of Pythias, a brotherhood organized to disseminate the principles of friendship, charity, and benevolence. The order was founded at Washington, D. C., 19 Feb. 1864, by Justus Henry Rathbone and four associates. An official declaration affirms that "toleration in religion, obedience to law, and loyalty to government" are its three cardinal tenets. The theme upon which the entire fabric of the society rests is the story of Damon and Pythias,—friendship even unto death being a paramount doctrine. The order at present is confined, in its jurisdiction, to the continent of North America; efforts earlier in its history to include the world as its field of action having proved futile. The name chosen, Knights of Pythias, rather than the more historically accurate designation of "Knights of Damon," was probably due to dramatic license, the reasons for which, like that of poetry, are obscure.

Origin.—The first drama of Damon and Pythias was a comedy, written 1571 A.D. The next effort of record was produced by John Banim,—the Irish poet,—associated with Richard Talor Sheil, who took the liberty of transposing the characters, making Pythias the hostage instead of Damon. This play was a tragedy and was first performed at Covent Garden, London, England, 28 May 1821. It was from the dramatic version of the story of Damon and Pythias that the founder of the order drew his inspiration, and it is the source from which has flowed the great Pythian river,—changing even the name of the society. The introduction, by the Irish poet, of the "fair Calanthe," the *affiancé* of Pythias, suggests an auxiliary order in which woman might labor with the Knights of Pythias, but no official recognition has ever been accorded to a branch admitting women to membership.

Founder.—Justus Henry Rathbone was born in Deerfield, Oneida County, N. Y., 29 Oct. 1839. He fitted for college at Utica, and be-

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came an *alumnus* of Madison University. His father, Justus Hull Rathbone, was a prominent attorney at Utica, N. Y., and his mother came of the famous Dwight family of New England. The original ritual was written during the autumn, winter, and spring of 1858-9, while Mr. Rathbone was a teacher in Michigan. He lived to see the order of the Knights of Pythias firmly established in all its branches,—with a membership of over 300,000. He died 9 Dec. 1889. On 27 July 1898, at Utica, N. Y., a monument raised to his memory was unveiled with imposing ceremonies. This memorial was erected by the order, from the proceeds of a 10-cents-per-capita voluntary contribution.

History.—On 15 Feb. 1864, in Washington, D. C., five clerks of the government met to organize the new order. Their names were: Justus Henry Rathbone, Robert Allen Champion, William Henry Burnett, and his brother, David L. Burnett, and Edward Sullivan Kimball, M.D. Four of these, including Rathbone, were members of the Arion Glee Club of Washington, organized in 1863. Rathbone and Champion were affiliated with the Improved Order of Red Men, the other three did not belong to a civic society. The first enactment recited that "This association shall not be a copy, or imitation, of any existing order, but that it shall be instituted independently, and be intensely American." The obligation administered was not altogether "in form," but proved sufficient. The ritual was then read by its author. "This work," said a survivor, "embodied practically all the tenets of the order of the Knights of Pythias, as now exemplified, although the arrangement was afterward changed somewhat, and its principal features were elaborated." The four eager auditors heard the dramatic possibilities which have made the society popular, wherever introduced, and parted to meet four evenings later, in a room in F Street, between 9th and 10th, N. W. Each agreed to invite other clerks to be present, it being Rathbone's suggestion that the membership be restricted to this class of employees in the governmental departments. One J. T. K. Plant was to be especially invited, because he belonged to several organizations, and was familiar with their methods and regulations. "Washington Lodge, No. 1, was organized in Temperance Hall, Friday evening, 19 Feb. 1864," so run the minutes. The number of members is not stated; but, at the close of the year, these had increased to 52. The "founder" was elected worthy chancellor, with associate officers: Vice chancellor, venerable patriarch, worthy scribe, assistant scribe, banker, assistant banker, worthy guide, inside steward, and four choral knights. Evidently the resolution, adopted on the 15th, had not yet gone into effect. The grand lodge of the District of Columbia, was formed 8 April 1864, with J. T. K. Plant as grand chancellor. The other grand officers followed the titles adopted by the subordinate lodge. Franklin Lodge No. 2 was organized at Washington Navy Yard 12 April 1864, and others followed in rapid succession. Then the order waned, until, 1 Aug. 1865, Franklin No. 2 was the only lodge in existence; and it was an acting grand, as well as a subordinate lodge. When the year 1865 closed, the membership in No. 2 was nearly 60 there was a treasury of \$200, and the "sole survivor" was in a prosperous condition, notwithstanding a

loss of \$255.55 through its "banker." On 1 May 1866 the grand lodge was reorganized, and the order spread to other jurisdictions. When the supreme lodge was constituted, 15 May 1868, the grand lodges of the District of Columbia, Pennsylvania, New Jersey, Maryland, and Delaware were represented. Through many trials, beset at times with disloyalty within and litigation without, from this beginning sprang the great order of the Knights of Pythias.

Government.—This is representative, and threefold, like the society's tenets. It is divided into three departments, namely: Legislative, executive, and judicial. These are regulated by statutes based upon constitutional provisions. In these particulars, and, in its methods of administration, the order has differentiated itself from others of its class. The government is vested in a supreme lodge, the source of all authority in the order; in State and provincial grand lodges, possessing subordinate authority over 10 or more lodges; in subordinate lodges, which create the membership by the acceptance of petitioners, and conferring upon them the ranks of "page," "esquire," and "knight." The supreme lodge was incorporated 5 Aug. 1870, under an Act of Congress approved the previous 5th of May, and many of the grand and subordinate lodges are, also, corporations. The order has, in addition to its three ranks, or degrees, an "endowment" rank, the insurance feature; and a "uniform" rank, the military division,—affiliation with which is voluntary, and predicated on regularity and good standing in the lodge. The titles borne by officers naturally follow the ritualistic structure. In the supreme body, with the prefix "supreme," these are, a chancellor, vice chancellor, prelate, keeper of records and seal, master of exchequer, master at arms, inner and outer guards. The endowment branch is managed by a board of control, the president of which is a supreme officer; and the uniform rank is commanded by a major-general, who is, also, an elective official. Prefix "grand" and the first eight become the names of officers of grand lodges. With one or two ritualistic variations, the officers of a lodge bear the same titles, excepting the prefix. Representatives are accorded the honor of "grand" or "supreme" in consonance with the name of the body in which they are elected to take seats. The executives are, respectively, the supreme and grand chancellors, and the chancellor commanders of subordinates. The judiciary consists of tribunes nominated by the executives and confirmed by the legislative bodies. Collectively these constitute the courts of last resort in the supreme lodge, and in grand lodges. Trials in subordinate lodges are conducted by committees. This judicial system has attained the dignity of a settled jurisprudence, the decrees of which are often recognized in actions brought in the civil courts.

Uniform Rank.—The organization of the display branch dates from 1878. The "rank" sprang at once into popularity, and the notable parade at Cincinnati in 1888 served to induce the supreme body to perfect its rules and regulations. Before that year creditable appearances had been made, but then trained soldiers, properly officered, were in line. Since that time the Pythian army has been a regular feature of all assemblages. "Not only this," says the major-general, commanding, "but the uniform—"

KNIGHTS OF THE ROUND TABLE—KNORTZ

has been most cordially welcomed by those outside of the order, and business and professional men, in our towns and cities, take pride in their local companies; while, in military circles, it has been hailed as a worthy addition to the military organizations of this continent." The ritual is emphatically patriotic; and the offer made to the United States government by this army of disciplined troops, for service in the Spanish-American war, is worthy of note. The powers of this branch are delegated to a supreme assembly,—with a representation in the aforesaid governing bodies,—and the organization follows the lines of the United States army, the "uniformed knights" using the government tactics.

Nomenclature.—Within the recesses of "castle halls," the terminology of the ages represented by the terms "page," "esquire," and "knight," govern the speech of those assembled. The jurisdictions of supreme and the grand lodges are called "domains," and all assemblies of the Knights of Pythias, "conventions." Members address one another as "brother knight." Documents are dated by the Pythian era, beginning with 1864. To find it, subtract 1863 from the common era. For example 1903—1863=40.

Statistics.—The reports for 1903 show 562,327 members, gathered in 6,992 subordinate lodges, governed by 54 grand lodges, and a supreme lodge. The total annual receipts are \$7,130,074.32; expenditures for relief, \$1,470,120.71; cash on hand, \$2,558,039.74; aggregate of lodge assets, \$11,109,913.57.

Bibliography.—Carnahan, "Pythian Knighthood, its History and Literature"; Van Valkenburg, "Jewels of Pythian Knighthood"; "Constitutions of the Supreme Lodge Knights of Pythias."

H. L. STILLSON,
Grand Tribune, Vermont.

Knights of the Round Table, the knights of King Arthur, according to some accounts 12 in number, famed for their valor, who sat at a round table in token of their perfect equality. Other versions of the legend give their number as 50 or more. The most famous of them are Lancelot, Tristram, Galahad, and Gawayne. See ARTHUR; ARTHURIAN LEGENDS; GRAIL, THE HOLY.

Knights of St. John and Malta, a secret society founded 1883. It has a grand encampment, 68 subordinate encampments and 3,227 members. Since organization the society has disbursed \$551,000 in benefits; and during 1902, the amount was \$65,000.

Knights Templars. See MASONIC FRATERNITY, THE.

Knightstown, Ind., town in Henry County, on the Blue River, and on the Cleveland, C. & St. L., and the Pittsburg, C. & St. L. R.R.'s, 34 miles east of Indianapolis. Near the town are the State Soldiers and Sailors' Orphans' Home. The town has excellent water power, natural gas, flour-mills, torpedo works and other industries, and owns the electric light and waterworks plants. Pop. (1890) 1,867; (1900) 1,942.

Knipe, Joseph Farmer, American soldier: b. Mount Joy, Lancaster County, Pa., 30 Nov. 1823; d. Harrisburg, Pa., 18 Aug. 1901. In 1842 entered the United States army, and served

in the Dorr Rebellion in Rhode Island, and subsequently in the Mexican War. At the outbreak of the Civil War he entered the volunteer service and was commissioned colonel of the 46th Pennsylvania regiment in August 1861. In May 1862 he was made a brigadier-general for gallant conduct, and after the War was postmaster at Harrisburg, 1866-9.

Knitting, an industrial and ornamental art allied to weaving, but of much later origin. It does not appear to be more than three or four centuries old, and seems to have been first used in the manufacture of stockings. It consists in forming a series of loops with a single thread, through which another row of loops is passed, and so on consecutively. In hand-knitting, steel-wires are used to form the loops on. For manufacturing purposes hand-knitting has been entirely superseded by machinery (see KNITTING-MACHINE), which is constantly receiving new improvements. Hand-knitting, however, still forms an agreeable domestic occupation, and also furnishes many women in some parts of the world with means of subsistence.

Knitting-machine. Of the many kinds of knitting-machines in use, one of the best known has a bed-plate with a vertically projecting and grooved needle-guiding cylinder or bed, and which is secured to a table or other suitable support. On the bed-plate is a loose ring with a thread-guide for conducting the thread to the needles, and about the needle-cylinder is a revolving cylinder with an annular groove interrupted by a cam-portion and provided with adjustable cams, which govern the downward motion of the needles, and consequently the length of the loops, and raise the needles; two of these latter cams being needed for reversing the machine for knitting a heel or a flat web. The cam-cylinder is moved by a bevel-gear connected to a driving-crank, and when moved continuously in one direction knits a circular web; and this web may be narrowed as desired, to fashion the leg, by removing needles, and placing their loops on adjacent needles. One needle receives the thread within its hook, and is subsequently moved by the cam-cylinder so as to form the thread so taken into a loop. When the heel is to be formed some of the needles are drawn up, their loops thus being retained and the number of needles left in action corresponds with the width of the heel to be formed. The cam-cylinder is now to be reciprocated in opposite directions, and in order to keep the thread-guide in advance of the descending needles sufficiently far, so that the thread will be caught, pins are inserted in the bed-plate to engage the heel of the thread-carrier and stop it just before the cam-cylinder is stopped.

Knolles, nörlz, or Knowlles, Richard, English historian: b. probably Cold Ashby, Northamptonshire, about 1550; d. Sandwich, Kent, 1610. He was graduated at the University of Oxford in 1565, and became master of the grammar school of Sandwich. He wrote a "General History of the Turks" (1603), the style of which is highly commended by Johnson, Hallam, and other critics. An improved edition, with continuations, by Sir Paul Rycaut, was published (1687-1700).

Knortz, nörzt, Karl, American miscellaneous writer: b. Garbenheim, near Wetzlar, 28

KNOT—KNOTTING AND SPLICING

Aug. 1841. He was educated at Heidelberg University and came to the United States in 1863. He taught in Detroit, Oshkosh, and Cincinnati, 1864–74, edited a German daily in Indianapolis for some years, and since 1892 has been superintendent of German schools in Evansville, Ind. Among his numerous works are: 'Tales and Legends of the North-American Indians' (1871); 'American Sketches' (1876); 'Longfellow' (1879); 'From the Wigwam' (1880); 'Indian Legends'; 'Pictures of American Life' (1884); 'History of American Literature,' in German (1891); 'Individuality' (1897); 'Child Study' (1899). He has very materially assisted in making American authors known in Germany.

Knot, a snipe (*Tringa canuta*) known in its migrations throughout the world, but breeding only in the extreme north, where its pale-green, spotted eggs have been found in only one instance. It appears in small flocks along all shores, and is a favorite with gunners under the names robin-snipe and gray snipe. Its plumage is a mingling of black and white suffused with a reddish tint on the under parts. The book-names refer to its habit of seeking its food just at the edge of the surface, where King Canute is fabled to have seated himself in defiance of the tide.

Knot, a term synonymous for a nautical mile. The log-line is divided by knots (or otherwise) into sections $\frac{1}{120}$ of a geographical mile in length, hence the number of sections run out in half a minute (the 120th of an hour) indicates the number of knots or geographical miles per hour at which the ship is going. The rate at which a vessel sails, or can sail, is usually given in knots per hour, the Admiralty knot or measured mile being 6,080 feet. It is longer than an ordinary statute mile by about one mile in seven; or the nautical mile of 6,080 feet = 1.151 statute mile.

Knot, Black. See FUNGI.

Knot-fungus. See FUNGI.

Knot-grass. See GRASSES.

Knot-root. See LABIATÆ.

Knots. See KNOTTING AND SPLICING.

Knott, nōt, James Proctor, American legislator and legal scholar: b. near Lebanon, Marion County, Ky., 29 Aug. 1830. He studied law in 1846–51, was admitted to the Missouri bar in 1851, and entered practice at Memphis, Scotland County. In 1858 he was elected to the Missouri legislature, in 1859 was appointed to the office of attorney-general of Missouri to fill a vacancy and in 1860 was elected to that post. Having refused, at the beginning of the Civil War, to take an oath of allegiance which he considered too severe, he was for a time imprisoned in the St. Louis arsenal. In 1862 he removed to Kentucky, where he established himself as a practitioner at Lebanon; and in 1867–71 and 1875–83 served in Congress as Democratic representative from the 4th Kentucky district. He was long chairman of the House committee on the judiciary. In the 41st Congress he made his well-known speech on Duluth, ridiculing the pretensions of the lake town, and gaining a national reputation as a humorist. He was governor of Kentucky in 1883–7, a delegate to the Kentucky constitu-

tional convention in 1891, professor of civics and economics in Centre College (Danville, Ky.) in 1892–4, and from 1894 professor of law and dean of the law faculty of Central University.

Knotting and Splicing, the fastening or tying of ropes or cords. There are hundreds of varieties of knots, most of which are used only on shipboard. Generally the requirements of a useful knot may be stated to be that it should neither "slip" nor "jam," that, while it holds without danger of slipping while the strain is on it, when slackened it should be easily untied again. The simplest knot is the common one tied on the end of a thread or cord to prevent it slipping. By passing a loop instead of the end of the cord the common slip-knot is formed; and a useful fixed loop is got by tying a simple knot, or the "figure of 8 knot" on the loop of a cord. One of the simplest and most useful running knots for a small cord is made by means of two simple knots. The most secure method of fastening a line to, say, a bucket is the standing bowline; and a running bowline is formed by passing the end through the loop thus making a running loop. Out of the score or so of methods of fastening a boat's painter the one which will be found most useful is the well-known two half-hitches. The timber hitch is useful for attaching a line to a spar or a stone, and the clove hitch is invaluable for many purposes. It is very simple and cannot slip. A simple method of fastening a rope to a hook is the blackwall hitch, where the strain on the main rope jams the end so tightly against the hook that it cannot slip. There are many methods for shortening a rope temporarily, one of them being the sheepshank.

Of the methods for uniting the ends of two cords the simplest and one of the most secure is the common reef knot, which must be carefully distinguished from the "granny," which will jam if it does not slip; the reef knot will do neither. For very small cords or thread the best knot is the weaver's. The fisherman's knot is a very useful one for anglers, and is formed by a simple knot in each cord being slipped over the other; when drawn taut it is very secure, and it is easily separated by pulling the short ends. A useful method of uniting large ropes is to tie a simple knot on the end of one rope and interlace the end of the other, and draw taut. This tie may also be made with the figure of 8 knot. For very large ropes the carrick bend is the simplest and most secure. The bowline bend is formed by looping two bowline knots into each other. For attaching a small line to a thick rope the becket hitch is very useful.

"Splicing" is the process employed to join two ropes when it is not advisable to use a knot. The three chief varieties of the splice are the short splice, the long splice, and the eye splice. The short splice is made by unlacing the ends of two ropes for a short distance and fitting them closely together; then, by the help of a marlinspike, the ends are laced over and under the strands of the opposite rope. When each strand has been passed through once, half of it is cut away and the remainder passed through again; half of the remainder being also cut away, it is passed a third time, and, when all the strands are so treated, they are hauled

KNOUT—KNOW-NOTHING MOVEMENT

taut and cut close. This reducing the thickness of the strands tapers off the splice. The long splice is employed when the rope is used to run through a block, as it does not thicken it. The ends of the two ropes are unlaid for a much longer distance than for the short splice, and similarly placed together. Then one strand is taken and further unwound for a considerable distance, and its vacant place filled up with the corresponding strand of the other rope, and the ends fastened as in the short splice. Other two of the strands are similarly spliced in the opposite direction, and the remaining two fastened at the original joining place. The eye splice is, as the term implies, used to form an eye, or round a dead eye.

To prevent a rope fraying at the ends a variety of methods are employed, the simplest being to serve or whip the end with small cord. Other methods are by interlacing the ends.

Knout, nowt, or noot, the official instrument of punishment formerly used in Russia, made in various forms, but usually being a whip of leather thongs artificially hardened, twisted with wire, etc. One hundred strokes with the knout were considered equivalent to a sentence of death, as the victim seldom survived the infliction.

Knowles, nōlz, Frederic Lawrence, American writer: b. Lawrence, Mass., 8 Sept. 1869. He was graduated from Wesleyan University in 1894 and since 1900 has been literary adviser of the Boston publishing firm of Dana, Estes & Co. Beside editing '*Cap and Gown*' (1897); '*Golden Treasury of American Lyrics*' (1897); '*A Year Book of Famous Lyrics*' (1901); and other compilations, he is the author of '*Practical Hints for Young Writers, Readers and Book Buyers*' (1897); '*A Kipling Primer*' (1900); '*On Life's Stairway*', verse (1900).

Knowles, G. Sheridan, English painter: b. Manchester 25 Nov. 1863. He was educated at private schools and studied art at Manchester and London, working at the Royal Academy Schools from 1884 to 1888. From that date he has actively pursued painting as a profession and has exhibited in the Royal Academy every year. His pictures are popular and romantic genre, and many of them have been engraved. His principal works are: '*The Last Minstrel*' (1889); '*The Return from the War*' (1892); '*The Wounded Knight*' (1895); '*Glasgerion*' (1897); '*The Flight of Huguenots from France*' (1900).

Knowles, James, English architect and editor: b. 1831. He was educated as an architect and among professional works of his are Tennyson's Surrey home, Aldworth; several churches in Clapham, and the fountain in Leicester Square, London. He originated the Metaphysical Society in 1869, edited the '*Contemporary Review*', 1870-7, and founded the '*Nineteenth Century*', of which he is the editor and proprietor.

Knowles, James Sheridan, Irish dramatist and actor: b. Cork, Ireland, 21 May 1784; d. Torquay, Devonshire, 30 Nov. 1862. He went upon the stage in 1806, but meeting with small success, taught elocution in Belfast and Glasgow. His tragedy of '*Caius Gracchus*' was performed at Belfast in 1815 with success, and from this time he had a prosperous career. In

1845 he retired from the stage from scruples of conscience, and in 1852 became a Baptist preacher and published several theological works. In 1849 he received a pension of £200 a year from Government. Among his principal works are the dramas: '*Caius Gracchus*' (1815); '*William Tell*' (1825); '*Virginius*' (1829); '*The Hunchback*' (1832); '*The Wife of Mantua*' (1833); '*The Love-chase*' (1837); '*Love*' (1839). In 1847 and 1849 he published two novels, '*Fortescue*' and '*George Lovell*'.

Knowles, Lucius James, American inventor: b. Hardwick, Mass., 2 July 1819; d. Washington, D. C., 25 Feb. 1884. He became a clerk in a shop at Shrewsbury, Mass., turned his attention to inventing, devised the Knowles safety steam-boiler feed-regulator, and constructed and operated several models of steam-engines. In 1843 he invented a machine for the spooling of thread, and this machine he manufactured at New Worcester in 1843-5. He then built spinning-machines for the manufacture of four- and six-cord thread, and manufactured cotton thread and warps at Spencer and Warren, Mass. (1847-53), and woolen goods at Warren (1853-9). Subsequently he manufactured a safety boiler-feeder, a steam pump, and a tape loom, under his own patents. He was elected to the lower house of the Massachusetts legislature in 1862 and 1865, and in 1869 became State senator.

Knowlton, nōl'tōn, Frank Hall, American botanist: b. Brandon, Vt., 2 Sept. 1860. He was graduated from Middlebury College, Vt., in 1884, was assistant palaeontologist on the United States Geological Survey 1889-1900 and palaeontologist from the last named date. Among his scientific monographs are: '*Fossil Wood and Lignite of the Potomac Formation*' (1889); '*Fossil Flora of Alaska*' (1894); '*Catalogue of the Cretaceous and Tertiary Plants of North America*' (1896).

Knowlton, Helen Mary, American artist and author: b. Littleton, Mass., 16 Aug. 1832. She studied art under William M. Hunt (q.v.) and Duverneck and has for 30 years taught art in Boston. Beside compiling Hunt's '*Talks on Art*', she has written '*Hints to Pupils in Drawing and Painting*' (1879); '*Life of William Morris Hunt*' (1899).

Knowlton, Thomas, American soldier: b. West Boxford, Mass., 30 Nov. 1740; d. battle of Harlem Plains, N. Y., 16 Sept. 1776. A farmer at Ashford, Conn., at the beginning of the Revolution, he was elected captain of a militia company organized after Lexington, and with 200 other Connecticut troops was sent to Charlestown. His detachment, ununiformed farmers with shot-guns, fought at Bunker Hill. On 8 Jan. 1776 he made a successful invasion of Charlestown, and subsequently became lieutenant-colonel of a regiment of Connecticut rangers. He was killed while leading his command, at the battle of Harlem Heights, and was highly praised by Washington in general orders.

Know-nothing Movement, The, a secret political association organized in the United States for the purpose of obtaining the repeal of the naturalization law, and of the law which permitted others than native Americans to hold office. It started in 1852 and existed two or three years. The principles of the Know-noth-

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ing party were embodied in the following propositions (at New York, 1855): (1) The Americans shall rule America. (2) The union of these States. (3) No North, no South, no East, no West. (4) The United States of America—as they are—one and inseparable. (5) No sectarian interferences in our legislation or in the administration of American law. (6) Hostility to the assumption of the Pope, through the bishops, etc., in a republic sanctified by Protestant blood. (7) Thorough reform in the naturalization laws. (8) Free and liberal educational institutions for all sects and classes, with the Bible, God's holy word, as a universal text-book. A society was formed in 1855 in opposition to the above, called Know-somethings. Both bodies were absorbed into the two parties, Democrats and Republicans, at the presidential election in 1856.

The Know-nothing organization was primarily the result of foreign emigration. In 20 years from 1825 to 1845, the immigration amounted to 1,028,225. The consequence was a sharp awakening of native American prejudice and alarm. The sentiment first showed itself in New York, where the alien population had reached portentous proportions, in the estimation of citizens of the old stock. A native organization for political purposes was effected, and in 1844 it succeeded in electing James Harper mayor on a native American ticket. About this time began the great immigration due to the Irish famine, and in the five years from 1845 to 1850 there came in about as many aliens as had been received during the whole 20 years before. Native Americanism flamed up hotter than ever, and its political conflagration extended to other cities and States. The great volume of the Irish immigration was Roman Catholic, and animosity to that church gave it fire. At Philadelphia two Roman Catholic churches were destroyed in riots between natives and Irish; at Boston a convent was burned. Six native American representatives were elected to the 29th Congress, that of 1845, four from New York and two from Pennsylvania. Between 1850 and 1855 the immigration amounted to nearly 2,000,000; and the native spirit was aroused even more hotly. Moreover, the anti-slavery agitation, expressing itself in opposition to the extension of slavery to the Territories, was disturbing party allegiance, and special efforts were made to kindle the native American spirit into a hot flame, with an ulterior motive, it was believed, of turning the current of public sentiment into other channels.

In 1852 the Know-nothing organization, distinctly, made its appearance. It was so-called because it was a secret oath-bound fraternity, regarding whose objects and whose real name its members always answered when questioned: "I don't know." "Americans must rule America!" was its rallying cry, and relentless hostility to the increasing power of the Roman Catholic Church and a demand for the extension of the naturalization to 21 years were its main purposes. The Know-nothings started off brilliantly. In 1854 they carried the State elections in Massachusetts and Delaware, and polled a great number of votes in New York. In 1855 they elected governors and legislatures in New York and four New England States, and at the South they were successful or nearly approached success in nine States. In 1856 eight of the

32 States had native American governors, but in the presidential election of that year the party cast only about one fifth of the popular vote and obtained only eight electoral votes, or the votes of the single State of Maryland. In the 35th Congress, 1857, it had 5 senators and 14 representatives. In the next Congress it had 2 senators and 23 representatives, all of them from Southern States. Soon thereafter Know-nothingism went to pieces rapidly and no more of it was heard in politics. It had no representation in Congress after the 36th. See also AMERICAN PARTY.

Knox, nōks, Adeline Trafton, American novelist; daughter of Mark Trafton (q.v.); b. Sacarappa, Maine, 8 Feb. 1845. She was married to Samuel Knox, a lawyer of St. Louis, Mo., in 1889. She has written: '*Katherine Earle*' (1874); '*His Inheritance*' (1878); '*An American Girl Abroad*'; '*Dorothy's Experience*' (1891).

Knox, George William, American Presbyterian clergyman; b. Rome, N. Y., 11 Aug. 1853. He was graduated from Hamilton College, Clinton, N. Y., in 1874, and from Auburn Theological Seminary in 1877. He subsequently was employed in missionary labors in Japan and was professor of philosophy and ethics in the Imperial University of Japan in 1880. On returning to the United States he became pastor of a Presbyterian Church in Rye, N. Y., and was a professor at Union Seminary, N. Y., 1897–9. He has written (in English): '*A Japanese Philosopher*' (1893); (in Japanese) '*A Brief System of Theology*'; '*Outlines of Homiletics*'; '*Christ, the Son of God*'; '*The Basis of Ethics*'; '*The Mystery of Life*'; '*The Christian Point of View*' (1902).

Knox, Henry, American general and cabinet officer; b. Boston, Mass., 25 July 1750; d. Thomaston, Maine, 25 Oct. 1806. He was the 7th son of William Knox, a native of St. Eustatius, West Indies, who settled in Boston and became a shipmaster. After the father's death in 1762, the son was employed by a Boston bookseller, and in 1771 he opened a bookstore of his own. When a young man he threw in his lot with the patriot cause and spent his leisure studying books on the military art, supplementing his reading by observing and questioning the British officers stationed in Boston. His marriage (16 June 1774) to Lucy Flucker, the daughter of an aristocratic loyalist of Boston, did not prevent him from joining the Colonial army at the outbreak of hostilities in the spring of 1775. He fought in the battle of Bunker Hill and then aided in constructing the defenses of the camps around Boston. The army being in pressing need of artillery, Knox proposed to Washington the plan of bringing heavy cannon and stores from Fort Ticonderoga near the Canadian frontier. He set out (15 Nov. 1775) on this perilous enterprise with a squad of mounted men. In the face of great difficulties he succeeded in getting 55 guns, loaded them on sleds, with 2,300 pounds of lead and a barrel of flints, and reached Cambridge in safety (24 Jan. 1776). For this brilliant exploit he was warmly complimented by Washington. After his return he received his commission as colonel of the one artillery regiment, the appointment having been made by the Continental Congress (17 Nov. 1775). The cannonade of

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Knox's batteries (on the night of 1 March 1776) enabled General Thomas to take possession of Dorchester Heights, which resulted in the evacuation of Boston by the British forces. In the summer of 1776 he was stationed at New York city with Washington, who found him a true friend and an able officer. In December he was promoted to brigadier-general of the artillery. He distinguished himself in the battles of Trenton and Princeton, and took part in the engagements at Brandywine, Germantown, and Monmouth. He helped (May 1777) General Greene in planning the defenses of the Hudson River. In the trying winter of 1777-8 he was in camp at Valley Forge, with his young wife. Many of Washington's letters refer to Knox in terms of high appreciation. He rendered valuable service in the operations against Cornwallis in October 1781, his skill as an artillerist being praised by the Frenchman, De Chastellax. He was made major-general (22 March 1782) and appointed to the command at West Point (29 Aug. 1782). Upon him devolved the delicate task of disbanding the army late in 1783. He had already formed the Society of the Cincinnati to keep alive the friendships of officers formed during the war.

Congress appointed Knox Secretary of War (8 March 1785), a position he worthily filled for ten years. In 1794 he was also at the head of the Navy Department, just organized. Owing to insufficient salary, he resigned from Washington's cabinet (2 Jan. 1795). His remaining years were passed at his home in Thomaston, Maine. Consult: Drake, 'Life and Correspondence of Henry Knox' (1873); Noah Brooks, 'Henry Knox, a Soldier of the Revolution' (1900).

EUGENE PARSONS,
Editor 'The World To-day.'

Knox, John, Scottish Protestant reformer: b. Giffordgate, Haddington, Scotland, 1505; d. Edinburgh 24 Nov. 1572. (The society of antiquaries of Scotland discussed the subject of his birthplace in 1858, when Mr. John Richardson of Haddington brought forward evidence that he was born in Giffordgate, a suburb of Haddington, and not in Gifford, a village near that town. He was supported in this view by Mr. Laing, the editor of the reformer's works.) After receiving his preliminary education at the grammar school of Haddington, he went in 1521 to the University of Glasgow, where for several years he studied scholastic philosophy and theology. Noted as a master of dialectic subtleties, he was ordained prior to 1530, and became a teacher of philosophy at St. Andrew's. The study of the fathers, especially of Jerome and Augustine, had shaken his religious opinion: as early as 1535, but it was not till 1542 that he became an avowed and marked reformer. The long period of silence, before in mature age he explained his views with completeness, has been regarded as proof that he was naturally of a prudent and peaceful disposition, and not a turbulent partisan, as his after career would indicate. His reprobation of certain practices of the Church caused him to retire from St. Andrews to the south of Scotland, where he was declared a heretic. After the death of his friend George Wishart, he remained in retirement till he took refuge with many other Protestants (1547) in the castle of St. Andrew's, which the regent was vainly attempt-

ing to reduce. There for the first time he became known as a powerful preacher against the papacy. The regent, re-enforced by a French squadron, obliged the garrison to surrender. The terms of the capitulation were violated, and Knox with his comrades was transported to France, where he was imprisoned on the galleys for 19 months. He experienced extreme hardships, and on his release (1549) directed his course to England, where he was appointed to preach at Berwick and at Newcastle, and became one of the chaplains of Edward VI. For the boldness of his discourses he was several times called to account, but was able to vindicate himself. A bishopric was offered to him, but he declined it from scruples as to the divine authority of the episcopal order. On the accession of Queen Mary he fled from England to Dieppe, and passed thence to Geneva, where, after taking part in the memorable troubles at Frankfort and after a short visit to Scotland, he became pastor (1556) of a small English congregation. The two years of his residence in Geneva, in the society of Calvin, Beza, and other learned men, were among the happiest of his life. While in Scotland he had been cited to appear before an assembly of the clergy to be held at Edinburgh, and after his return to Geneva the citation was renewed, and he was condemned to be burned as a heretic, and the sentence was executed on his effigy. Against this condemnation he published the 'Appellation of John Knoxe.' He also wrote a tract entitled the 'First Blast of the Trumpet against the Monstrous Regiment of Women' (1558), a vehement attack on the political government of women, at a time when Mary of Guise was regent of Scotland and Mary Tudor queen of England, and the nearest in succession to both thrones were females. Invited by the Scottish Protestants to resume his labors in his native country, he landed at Leith in 1559. The queen regent had laid her plans for the forcible overthrow of the reformation. At a convention of the nobility and clergy in Edinburgh all the demands of the Protestants were refused. Several of the reforming preachers were summoned to appear at Stirling for trial, but by the dissimulation of the regent were prevented from attending and then outlawed for their failure. Knox hastened to meet them at Perth, where he preached against the "idolatry of the mass" and the veneration of images. At the conclusion of the service there was a violent outbreak. The images in the churches were demolished, the pictures torn from the walls and trampled under foot, the holy recesses invaded, and the "rascal multitude," as Knox calls them, did not stop till they had sacked and laid in ruins the houses of the Dominican and Franciscan friars and the Carthusian monastery. The queen regent advanced upon Perth with an army, but, finding the Protestants well prepared for resistance, proposed terms of accommodation which were accepted. The Protestants, in order to consolidate their strength, formed a religious bond or covenant, and began to be distinguished as the congregation, and their leaders as the lords of the congregation. Iconoclasm was a prominent feature in the Scottish reformation. Events similar to those at Perth followed at Stirling, Lindores, Cupar, St. Andrews, and other places. Knox had preached in the cathedral of St. Andrews with such success that the

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magistrates united with the inhabitants in desolating the churches and monasteries, and in establishing the reformed worship. Meantime civil war raged throughout the kingdom between the regent, assisted by French troops, and the lords of the congregation. In political as well as ecclesiastical affairs Knox was a conspicuous adviser, and took up his residence in Edinburgh after an extensive circuit through the southern and eastern counties. After a contest of 12 months, the vigorous assistance rendered by Elizabeth, and the death of the queen regent while the English troops were investing Edinburgh led to a truce and to the summons of the Parliament to settle differences. Parliament assembled in August 1560, the reformed religion was established, and Roman Catholicism interdicted by law in Scotland. Soon after the arrival of the young Queen Mary (21 Aug. 1561) she summoned the influential and noted reformer to her presence. Six interviews are recorded between him and the queen, and the questions which she raised were discussed by him with a rude vehemence and rigor, which once drove her to tears. She caused his arrest on a charge of treason in 1563, but all the councillors except the immediate dependents of the court voted for his acquittal. The vehemence of his public discourses led him into frequent difficulties. In 1562 he disputed publicly for three days with Abbot Quentin Kennedy at Maybole; in 1565 he quoted certain texts which gave offense to the court, and was for a short time prohibited from preaching. He fled from Edinburgh when the queen returned from Dunbar after the death of Rizzio; and he preached a sermon at the coronation of the infant king at Stirling (29 July 1567). Under the brief regency of Moray, the work of Knox seemed to be completed, but after the assassination of Moray, civil and religious confusion returned under the regency successively of Lennox and Mar. Weakened by a stroke of apoplexy in 1570, Knox yet reappeared in the pulpit, but so violent was the enmity excited by his animadversions that he left Edinburgh for St. Andrews 5 May 1571. He returned in the following year, and his last energies were put forth in denunciations of the perpetrators of the massacre of St. Bartholomew's.—The doctrines of Knox embraced a Calvinistic creed and a Presbyterian polity. The "Order of Geneva," a liturgy which he shared in preparing for the use of the church at Frankfort, and subsequently employed in his congregation at Geneva, was introduced into Scottish Protestant churches in 1565. His character was marked by a stern realism, which could be beguiled by no social pretensions, no conventional dignities, no pompous traditions. From this sprang his scornful bitterness and his insensibility to the social graces and refinements which Mary exhibited. He was not a thinker except on political topics. His "History of the Reformation of Religion in the Realme of Scotland" is the best known of his writings. Consult: "Lives," by McCrie (1813); Taylor (1885); P. H. Brown (1893); Lorimer, "John Knox and the Church of England" (1875); Carrick, "John Knox and his Land" (1902).

Knox, John Jay, American financier: b. Knobxboro, N. Y., 19 March 1828; d. New York 9 Feb. 1892. He was graduated at Hamilton College in 1849, and was a banker till 1862. In

that year he received an appointment from Secretary Chase, and subsequently had charge of the mint coinage correspondence of the Treasury Department, becoming in 1867 deputy comptroller of the currency. A bill which he proposed was passed with a few modifications, and is known as the Coinage Act of 1873. In 1872 he was appointed comptroller of the currency, resigning in 1884, to become president of the National Bank of the Republic, New York. In addition to various Reports, he published "United States Notes" (1884, revised 1887).

Knox, Philander Chase, American lawyer and politician: b. Brownsville, Pa., 4 May 1853. He was graduated from Mount Union College, Ohio, in 1872; studied law and was admitted to the bar in 1875. He was assistant United States district attorney for the western district of Pennsylvania in 1876-7; resigning this position he took up the practice of law in Pittsburgh in partnership with J. H. Reed. The firm's practice grew rapidly, and Knox became known as one of the most successful corporation lawyers in the United States; in 1892 he was counsel for Carnegie during the Homestead strike. April 1901 he was appointed attorney-general of the United States. In this office he has necessarily been involved in the "anti-trust" agitation; he has dealt with the question from a purely lawyer's standpoint, and in 1902 brought suit against the Northern Securities Company and the so-called "Beef Trust" on the ground that they were violating Federal statutes, seeking in this way to test and enforce the laws for controlling large combinations of capital.

Knox, Thomas Wallace, American journalist and traveler: b. Pembroke, N. H., 26 June 1835; d. New York 6 Jan. 1896. He went to Colorado in 1860 and there engaged in journalism, and during the Civil War served as volunteer aide. He made a journey around the world as a newspaper correspondent in 1866 and again in 1877, and wrote many popular books for young people. Among his very numerous published works are: "Underground Life" (1873); "How to Travel" (1880); "Boy Travelers Series" (15 vols. 1880-94); "Lives of Blaine and Logan" (1884); "Decisive Battles since Waterloo" (1887); "The Lost Army" (1894); "Hunters Three" (1895); "In Wild Africa" (1895); etc.

Knox College, a coeducational institution, founded in 1837 at Galesburg, Ill., as Knox Manual Labor College. The school was opened in 1841, and in 1857 the name was changed to Knox College. The original plan for founding and maintaining the school was to secure subscriptions to the amount of \$40,000 and to purchase lands in the Mississippi Valley, at government price, the lands to be resold at a profit. Every subscriber who purchased 80 acres of land was given free tuition for one student for 25 years. In 1902 the productive fund amounted to about \$250,000. The tuitions and other fees amounted to \$14,526; the income from the productive funds and other sources was nearly \$15,000. There are in the library about 10,000 volumes. In 1903 there were connected with the school 35 instructors and professors; and 700 students. A music department was established in 1883. The famous Lincoln-Douglas debate, in 1858, was held on the grounds of this college.

KNOX-LITTLE — KNOXVILLE

Knox-Little, William John, English Anglican clergyman and author: b. Stuartstown, County Tyrone, Ireland, 1839. He was educated at Cambridge University, took orders in the English Church, and after holding several curacies was rector of St. Alban's, Cheetwood, Manchester, 1875-85. Since 1885 he has been canon residentiary of Worcester Cathedral and vicar of Hoar Cross. He is an "advanced" churchman and has several times visited the United States, where he has preached in many Episcopal churches conspicuous for High Church leanings. He is a popular religious writer, and among his many books are: 'Meditations on the Three Hours' Agony of Our Blessed Redeemer' (1877); 'The Broken Vow: a Story' (1887); 'The Child of Stafferton' (1888); 'The Perfect Life' (1899); 'Studies on South Africa' (1899); 'Holy Matrimony' (1900).

Knoxville, nöks'v'il, Iowa, city and county-seat of Marion County, on the Chicago, B. & Q., and on the Chicago, R. I. & P. R.R.'s, 35 miles southeast of Des Moines. Here is the State Industrial Home for the Blind, court house, high school and public library. It is the centre of an extensive coal-mining, stock-raising and agricultural district, and has flour-mills, canneries and machine shops. Pop. (1890) 2,632; (1900) 3,131.

Knoxville, Tenn., city, county-seat of Knox County; on the Tennessee River, and on the Knoxville & A., the Knoxville, C. G. & L., the Southern, and the Atlanta, K. & N. R.R.'s; about 110 miles northeast of Chattanooga. It is connected with South Knoxville, on the south side of the river, by a magnificent steel bridge. The site is a picturesque one, being near the centre of the valley between ranges of the Alleghany and Appalachian Mountains, which are visible from several points in and about the city. It is built on a series of sloping hills and their intervening valley-like spaces; the average elevation above the sea-level being about 1,000 feet. It is the commercial centre of a large area of territory, embracing, besides the eastern division of Tennessee, also western North Carolina, southwestern Virginia, North Georgia, and a large part of eastern Kentucky. The rich coal fields which furnish so large a proportion of the fuel supply for the Southern States are from 25 to 60 miles distant from Knoxville. These are the Coal Creek and Jellico districts, and the operators of a majority of these mines have their headquarters in Knoxville.

History.—Knoxville was founded in 1791, by Gen. James White, who had been an officer in the American army in the War for Independence. It was named in honor of Gen. Knox, of Revolutionary fame, the first secretary of war. The first building, a block house, was erected for the protection of the pioneer settlers against the attacks of Cherokee Indians. For a number of years Knoxville was a government military post, barracks being erected for the accommodation of those in the military service. In those days Knoxville was the centre of interest in connection with Indian depredations so common in the settlement of Tennessee.

Trade and Manufactories.—For more than a third of a century Knoxville has been doing a large wholesale business. Wholesale merchants have reached out for additional markets into all the surrounding States. It has good shipping

facilities and a branch of the Louisville & Nashville road, about 65 miles in length, is being built and when completed will give the city additional direct connection with the Northwest. During two thirds of the months of the year small steamboats ply on the Tennessee and French Broad rivers, above and below the city and do a large amount of local business. The growth in the number and the capacity of manufacturing establishments in the past decade has been very marked. More than 28 per cent of the entire population of the city is engaged in manufacturing. The chief manufactures are woolen and cotton goods, furniture and cabinet mantels, marble sawed and polished, bar iron, boilers, stoves, castings, coffins and caskets, iron fencing, ready-made clothing, beer, desks, and flour. The woolen and cotton factories, the marble works and the flour mills are large establishments. The growth of small manufacturers in the past ten years is a feature that is attracting attention. The marble which is found in quarries at the very gates of the city is used for ornamental purposes in almost every large public or private building being erected in any part of the United States, and the hardwood cabinet mantels being manufactured here are sold in almost every State in the Union. The great abundance and close proximity of raw material—timber, a large number of varieties: coal, iron ore, marble, and zinc, make the place desirable as a manufacturing site.

Climate.—The near proximity of the tall mountains on either side, almost surrounding the valley of which Knoxville is so nearly the geographical centre, does much to modify climatic conditions, and to render them different from those of other cities situated in about the same latitude. The city and surrounding country has been comparatively immune against destructive storms. The average mean annual temperature for a period of 25 years, as shown by the local records of the Government Weather Bureau, is 57°, the mean summer temperature 74°; mean winter 40°; mean spring 57°; mean autumn 58°. The temperature in winter has occasionally gone as low as zero, slightly below, but has continued only for a short time. The maximum mid-day summer temperature has gone as high as 100°, but as a rule the nights are cool.

Banks.—There are eleven banks in the city, five of them national banks. Their combined capital is \$1,050,000, with \$472,000 surplus and undivided profits. The transactions of the clearing-house have trebled in the past ten years, and during the present year (1903) have averaged over a million dollars weekly.

Churches and Schools.—There are 42 churches in the city for the white population and 17 for the colored. All but one of these are Protestant. The leading denominations, reckoning on the basis of the number of communicants, are the Methodists, Baptists and Presbyterians, in the order mentioned. There are two Protestant Episcopal, three Christian, and two Lutheran churches. It is the seat of the University of Tennessee, the East Tennessee Female Institute, the Tennessee Normal College, the University (preparatory) School, and Saint Mary's Academy. The Knoxville College, for colored students, founded and maintained by the United Presbyterian Church, is located here. The public schools have ten

KNURR-AND-SPELL — KOCH

buildings for the white children, and four for the colored. About 100 teachers are employed. The school session is nine months in the year at an average annual cost of about \$55,000. The State School for Deaf Mutes is located in Knoxville, also the Lyons View branch of the State Hospital for the Insane.

Benevolent Institutions.—Among the chief of these is the Industrial School for Juveniles, sustained at the expense of Knox County, capable of housing and giving instruction to 200 girls and boys; the Home for Aged Women and an orphanage. The Knoxville General Hospital was erected at a cost of more than \$50,000, and is one of the leading institutions of its kind in the South.

Government.—The city is governed by a mayor and board of aldermen elected by the people for the term of two years, and a board of public works elected in the same manner. The assessed value of property for taxation is \$14,000,000 which is not exceeding 75 per cent of its actual value. The bonded debt of the city is \$1,200,000, most of which was created for paving streets, constructing sewers, building bridges, and other public improvements. The city is supplied with pure wholesome water, from the Tennessee River, by a private corporation which owns the water plant. The lighting plants, gas and electric, are also owned by private corporations.

Population.—The population by the census of 1900 was 32,637; in 1890 it was 22,535; in 1880 9,663; in 1870 8,682. In 1900 the colored population numbered 22.5 per cent of the whole and the foreign population 2.7. The increase in recent years has been very rapid, and it is claimed now (1903) with good reason, that the population of the city and close in suburbs, not embraced in the municipal limits, is at least 60,000.

W.M. RULE,

Editor Knoxville 'Journal and Tribune.'

Knurr-and-Spell. See NUR-AND-SPELL.

Knyphausen, knip'how-zēn, BARON **Wilhelm von**, German soldier: b. Lützberg 4 Nov. 1716; d. Cassel 7 Dec. 1800. Educated at Berlin, he entered the Prussian army in 1734, in which he became in 1775 a general officer under Frederick II. (the Great). He came to the United States in that year as second in command of the Hessians in the English service, and superseded Gen. von Heister as commander-in-chief in 1777. He fought at Long Island, White Plains, Brandywine, and Monmouth; and during the temporary absence of Clinton in 1780, commanded New York. In 1782 he returned to Germany, where he later became military governor of Cassel. He was a capable soldier, and had no high opinion of his unreliable mercenaries.

Koa'la, a remarkable marsupial (*Phascolartos cinereus*) of the family *Phalangeridae*, found chiefly in the interior of New South Wales, and known to the colonists as "native bear." It is about two feet long, and has a heavy, depressed, somewhat bear-like form, no tail, strong limbs with five digits armed with long claws on each, the inner digit on the hind feet and two inner on the fore feet opposable to the others, the ears large and like the rest of the body covered with a dense gray woolly fur. These characteristics fit it for an arboreal existence, and it lives alto-

gether in trees, descending only occasionally to dig for roots. It is especially active at night and feeds on leaves and buds of eucalyptus trees. It is timid and defenseless, and is killed with clubs by the Australian blackfellows, who eat its flesh. Compare WOMBAT, and consult authorities cited under MARSUPIALIA.

Kobbé, köb'bä, Gustav, American author and journalist: b. New York 4 March 1857. He was graduated at Columbia University in 1877, and at its Law School in 1879; and has since been employed in newspaper and magazine work. He has published: 'The Ring of the Nibelungen' (1889); 'Wagner's Life and Works' (1890); 'My Rosary and Other Poems' (1896); 'New York and Its Environs' (1891); 'Plays for Amateurs' (1892); 'Miriam' (1898); 'Opera Singers' (1901); 'Signora, a Child of the Opera House,' a novel (1902).

Kobbe, köb, William A., American general: b. New York 10 May 1840. He was educated in Germany till 1862 and was graduated from West Point in 1873. He served in the Civil War in the 7th New York regiment and rose to the rank of captain. In the war in the Philippines he was placed in command, in January 1900, of an expedition to the southern extremity of Luzon, and in March following was appointed military governor of the Province of Albay (Luzon), and Catanduanes Island, and temporary governor of the islands of Samar and Leyte. On the reorganization of the regular army in February 1901, he was appointed one of the new brigadier-generals.

Kobé, kō'bē, Japan, a treaty port and former municipality of the main island Hondo, on the west shore of the Gulf of Osaka, adjoining on the northeast the prefectoral city of Hiogo (q.v.), with which it was united in 1892. It is the most important of the treaty ports with the largest trade, a fine harbor, docks, wharves for ocean steamers, ship-building yards, railway shops and other important industrial establishments. Kobé is well laid out with wide streets, electrically lighted. Pop. (1898) 215,780.

Ko'bold, a species of elf in the popular superstition of Germany, corresponding to the English *goblin*. The kobold is connected with a house or a family, and appears in bodily shape.

Koch, kōh, Robert, German bacteriologist: b. Clausthal, Hanover, 11 Dec. 1843. He received a medical education at Göttingen (1862-6), was assistant-surgeon in the Hamburg general hospital, was in private practice at Langenhagen (Hanover), Rakwitz (Posen), and Wollstein (Posen), and in 1872 was appointed to the Imperial board of health. In 1882 he succeeded in isolating the tubercle bacillus, in 1883 was made privy councillor and became director of the cholera commission to India and Egypt. He discovered in 1884 the cholera spirillum, or comma bacillus, regarded as a positive test of the presence of Asiatic cholera. For this service he received by legislative act a gift of 100,000 marks (\$25,000). In 1885 he was appointed professor in the University of Berlin, director of the newly established Hygienic Institute of Berlin, and also director of the Prussian board of health. He announced in 1890 the discovery of a substance called tuberculin, which, he asserted, would cause to cease the growth of the tubercle bacillus.

KOCK—KOKOMO

Subsequent experiment failed in the judgment of scientists to confirm his claim in connection with the treatment of human beings. Among his writings are: 'Beitrag zur Aetiologie der Tuberkulose' (1882); 'Ueber die Cholerabakterien' (1884); and 'Weitere Mitteilungen über ein Heilmittel gegen Tuberkulose' (1890).

Kock, Charles Paul de, shär'l pôl dë kôk, French novelist: b. Passy, France, 21 May 1794; d. Paris 29 Aug. 1871. He was the son of a Dutch banker who was guillotined in 1794. At 15 he was placed in a banking-house, but presently took to writing, and his reputation was soon established by such works as 'Georgette' (1820); 'Gustave, ou le mauvais Sujet' (1821); 'Mon Voisin Raymond' (1822). The last is regarded as the typical romance of its kind. His scenes are cast in the lower ranks of middle-class life. His narrative is a constant succession of stirring incidents without catastrophe. The incidents are always gay and lively, frequently somewhat gross, but scarcely to the extent of indecency. The worst feature of Paul de Kock's works is his style, which is barely presentable, a fault evidently due to deficiency of education. This accounts for his popularity being greater abroad than at home, as the defects of style disappear in translation. Besides his novels, which are very numerous, he wrote several dramas, chiefly taken from them. Consult: Trimm, 'La Vie de Charles Paul de Kock' (1873).

Ko'dak, a portable photographic camera of special type for taking instantaneous negatives. It is made in the form of a small box having a lens and a shutter in one side and a reflector on top by which the operator can focus the lens. When this has been done a button is pressed and the snap-shot is taken. The kodak is provided with a continuous roll of sensitized film on which successive negatives can be made.

Koehler, ké'lér, Robert, American artist: b. Hamburg, Germany, 28 Nov. 1850. He came with his parents to the United States in 1854; was educated at Milwaukee, Wis., and learned lithography which he practised in Pittsburg, Pa., and New York. After studying drawing in the night classes of the National Academy of Design, he went to Munich where he learned painting under Loeftz and Defregger and chose genre as his special field of activity. His principal pictures are: 'Holiday Occupation'; 'Her Only Support'; 'The Socialist'; 'The Strike'; 'The Family Bible'; and 'Father and Son.' Since 1893 he has been director of the Minneapolis School of Fine Arts.

Ko'el, one of a group of East Indian and Australian fruit-eating cuckoos, of the genus *Eudynamis*, which are popularly known as "rain-birds." They are parasitic, but have many peculiarities, among which are the glossy black plumage of the males, and the fact that, contrary to the rule, the immature young resemble the males instead of the females, which have a reddish dress. A Philippines species (*E. mindanensis*) is locally called "phow." They utter loud whistling cries.

Kogia, kô'jî-a, the generic and ordinary name of the "pigmy" sperm whales of the Pacific, which differ from the true sperm whales (q.v.) in anatomical particulars, and conspicu-

ously in size, not exceeding about 15 feet in length. There are several species of these cetaceans which belong mainly to the New Zealand region, although one species visits the coast of California, but they are little known.

Koh-i-Nûr, kô'é-noor', or Kohinoor. See DIAMOND.

Kohl, Johann Georg, yô'hän gä'örg kôl, German traveler and historian: b. Bremen 28 April 1808; d. there 28 Oct. 1878. Nearly his entire life was devoted to travel and historical investigation in Europe and in North America, where he spent four years and published as the fruits of researches: 'Travels in Canada' (1855); 'Travels in the Northwestern Parts of the United States' (1857); 'History of the Discovery of America' (1861); and several essays on American cartography. Other works are: 'Travels in the Interior of Russia and Poland' (1841); 'The British Isles and Their Inhabitants' (1844); 'The Rhine' (1851); 'The Danube' (1853).

Kohl-Rabi, kôl-ra'bî, a botanical variety of the same species as cabbage (q.v.), from which it differs in the swelled, turnip-like stem with a tuft of loose leaves on the top. This bulbous stem, which may be six inches in diameter, is used for human and stock food, less in America than in Europe. Its quality and texture are less agreeable, except in very young plants, than are those of turnips and cabbage.

Kohler, ko'lér, Kaufmann, American rabbi: b. Furth, Bavaria, 10 May 1843. After completing his studies at the universities of Munich, Berlin, and Leipsic, he was chosen as rabbi in Detroit in 1869, and two years later elected rabbi of Temple Sinai, Chicago, where he introduced Sunday lectures, a novelty in those days. In 1879 he was called to Temple Beth El, New York. At his initiative in 1885 a rabbinical conference was held at Pittsburg, Pa., which formulated a platform for Reformed Judaism. In later years he frankly receded from the radical standpoint and assumed a more conservative position. In 1903 he was elected president of the Hebrew Union College. He has been a frequent contributor to the Jewish press, and in addition to various volumes and critical papers has written: 'Der Segen Jakobs' (1868), and a 'Guide to Instructions in Judaism' (1900).

Kohlsaat, kôl'sät, Herman Henry, American publisher. He was educated in the public schools of Chicago and Galena, Ill., and after acting as traveling salesman for several years for Chicago firms, became in 1880 a junior partner in a wholesale bakery. He subsequently acquired a fortune in the bakery business and other enterprises, and in 1891 became part owner of the *Inter-Ocean* of Chicago, and in 1894 owner of the *Chicago Times-Herald*, now *The Record-Herald*, and of the *Chicago Evening Post*.

Koko-nor, kô'kô-nôr', or Kuku-nor, a lake in Tibet, not far from the Chinese province of Kan-su. It lies 12,097 feet above the level of the sea. Its very salt waters, exquisitely blue in color, cover 66 miles by 40. It contains five islands, one with a Buddhist monastery.

Kokomo, Ind., city, county-seat of Howard County; on the Wildcat River, and on the Toledo, St. L. & K. C., the Pittsburg, C. C. & St. L., and the Lake Erie & W. R.R.'s; about 55 miles north of Indianapolis. It was settled in 1844 by

KOLA-NUT — KONGO FREE STATE

Daniel Foster, incorporated as a town in 1845 and chartered as a city in 1855. Kokomo is located in a region of good farms, but it is a manufacturing and commercial city. The chief manufacturing establishments are plate, opalescent and table glass works, potteries, steel-mills, a fibre-bond mill, stove works, rubber works, automobile factories, bit works, pulp- and paper-mills; all employing about 7,500 men. There are seven churches, a classical school, a high school, public and parish schools, and a public library. The three banks have a combined capital of \$300,000. The government is vested in a mayor and 10 councilmen, elected biennially. Pop. (1890) 8,261; (1900) 10,609; (1903) 17,000, of which about 1,500 are Germans; 1,000 French, and 1,000 Irish.

J. A. KANTZ,
Editor of 'Kokomo Tribune.'

Ko'la-nut. See COLA-NUT.

Kol'berg. See COLBERG.

Kolb's Farm, Engagement at. After the action at Pine Mountain (q.v.), 15 June 1864, Gen. Sherman closed in on the Confederate army defending Marietta and the railroad south to the Chattahoochee, and began the extension of his lines to the right. The Confederates made a corresponding move to the left, and on the night of the 21st Hood's corps of two divisions, Hindman's and Stevenson's, moved from the right, near the railroad north of Marietta, to the Marietta and Powder Springs road, near Zion Church, about four miles southwest of Marietta, and a mile east of Kolb's Farm. Hood now occupied the extreme left of the Confederate line, and had been instructed by Gen. J. E. Johnston to endeavor to prevent any progress of Sherman's right toward the railroad, the course of which was nearly parallel to the Confederate left and centre, and which was seriously menaced by Hooker's and Schofield's corps. On the morning of the 22d Schofield had advanced one division, Hascall's, on the road from Powder Springs Church to Marietta, with orders to take position on Hooker's right, near Kolb's house. Hooker, in going to the right and forward, reached to the Marietta road at Kolb's, and made connection with Hascall's division. Williams' division, massed by brigades, held Hooker's right, Geary's division was on the left of Williams, and Butterfield's division was further to the left on the line of Howard's Fourth corps. Williams and Hascall had very sharp skirmishing in getting into position, and from prisoners taken of Hood's corps it was learned that Hood, supported by Hardee, was about to attack, upon which both Williams and Hascall were ordered to deploy their divisions, and they threw up breastworks, Hascall in heavy woods, and Williams, for the greater part, on open, commanding ground, giving good positions for artillery. The deployment had not been completed and but few breastworks had been thrown up when, about 5 P.M., Hood made his attack. As he advanced from the woods which had sheltered him and concealed his line, his right was met by a terrific fire of shell, case-shot, and canister, that tore great gaps in the line and partially broke up his formation; but he pressed on and, coming under still closer canister fire and deadly volleys of musketry, was repulsed after a most desperate struggle of less than an hour. The attack fell upon the divisions of Williams and Hascall, Williams losing only

130 killed and wounded, and Hascall a less number. Hood's loss was 1,012 killed and wounded and about 100 missing. Consult: 'Official Records,' Vol. XXXVIII.; Cox, 'Atlanta'; Johnston's 'Narrative.'

E. A. CARMAN,

Kol'lock, Mary. American painter: b. Norfolk, Va., 20 Aug. 1832. She studied at the Academies of New York and Philadelphia, as well as in the Julian school at Paris. In 1877 she was elected instructor in painting to the Ladies' Art Association of New York. She has been industrious in filling many canvases with her graceful landscapes and simple genre groups, and her latest works include: 'Road in Normandy'; 'The Italian Brigand'; 'Washing in Pont-Aven, France'; and 'The Gossips.'

Kolmar, kôl'mar, Germany, city and capital of Upper Alsace, formerly in the French department of Haut Rhin, 39 miles south of Strasburg. Its fortifications were destroyed in 1673, and it is now surrounded by boulevards, and entered by three gates. Here is the public library with 36,000 volumes, and some pictures by Schön, Albert Durer, etc.; and the museum, where, among other curiosities, a remarkable aerolite is preserved, which fell near Ensisheim in 1492, and originally weighed about 284 pounds. The portion here weighs about 142 pounds. Kolmar has manufactures of printed goods, calicoes, silks, etc., besides cotton-spinning mills, tanneries, and chamois-leather works. It has a considerable trade in the manufactured goods of Alsace, and in iron, grain, wine, madder, etc.; and in colonial produce, with which it supplies Switzerland. In 1552 Kolmar was surrounded by walls and towers, and made an imperial free town. In 1632 it was taken by the Swedes, who kept it two years. It was united to France in 1697 by the Peace of Ryswick, and surrendered to Germany by the Treaty of Versailles, 26 Feb. 1871. Pop. (1890) 30,411; (1900) 36,736.

Kolyma, kô-lé'má, a river of Siberia, in the government of Yakutsk, which rises in the mountains of Stanovoi-Krebet. After a course of about 1,000 miles it falls into the Polar Sea. The chief tributaries are the Greater and the Lesser Aniuj and the Omolon, which enter it on the left not far from the sea. Afterward the river divides into two, and subsequently into three branches, forming a delta. The Kolyma has sufficient depth for any vessel, but navigation, especially at the entrance, is rendered dangerous by shifting sand-banks.

Kom'ba. See GALAGO.

Kongo, kông'gô, or Congo, Free State, an independent State in Central Africa, constituted in 1885. It is bounded northwest and north by French Kongo and British East Africa, the dividing line being partly the Kongo itself and its tributary the Ubangi; on the east it is bounded by British East Africa, German East Africa, Lake Tanganyika, and British Central Africa; on the south by the Portuguese and British territories. It reaches the Atlantic at the mouth of the Kongo by a narrow neck of land. The territory has an area of about 900,000 square miles, and is divided into 15 administrative districts, namely, Banana, Boma, Matadi, the Falls, Stanley Pool, Kwango, Oriental, Kassai, Lake Leopold II., Bangala, Equator, Ubangi, Welle, Stanley Falls, Aruwimi, and Lualaba, each of these districts being under a commissioner. The northeastern portion of the State,

KONGO RIVER—KONGO-SNAKE

forming fully one third of the whole, is mostly under dense and almost impenetrable forest, but the remainder largely consists of arable land of considerable fertility. Among the cultivated plants are maize, millet, manioc, tobacco, coffee, sugar-cane, hemp, bananas, etc., and most of the fruits and vegetables of Europe have been found to thrive excellently. The wild animals include the elephant, hippopotamus, crocodile, buffalo, antelopes of various kinds, the chimpanzee, soko, etc. The imports consist mostly of woven goods, spirits, tobacco, and firearms, and the exports comprise ivory, rubber, ground-nuts, palm-oil, gum-copal, wax, etc. The climate is very unhealthful to white men, owing to the combination of great heat with a very moist atmosphere, but in a few of the more elevated spots it is much better. There are two rainy seasons, namely, October-December and February-May, the latter being much the wetter, and between these intervene the two dry seasons. There are not as yet many good roads in the State, but there are thousands of miles of navigable rivers. The Kongo is navigable from the sea up to Matadi, and again for 1,000 miles between Stanley Pool and Stanley Falls, but the portion between Matadi and the Pool is obstructed by cataracts. A railway has, however, been opened between these two places. The bulk of the inhabitants are of Bantu stock, but in the extreme north the proper negro type is found, and in some of the eastern parts of the State Arabs and other ethnical groups occur. Large numbers of the inhabitants are cannibals of the most pronounced type, and the vast majority are heathens.

After Stanley had proved the identity of the Lualaba with the Kongo, a Comité d'Etudes du Haut Kongo was formed under the auspices of Leopold II., king of the Belgians; and in 1879 this body commissioned Stanley to return to the Kongo region with a view to preparing for the development of its resources. He established his first station at Vivi, and afterward founded others at Isangila, Manyanga, Leopoldville, Equatorville, Stanley Falls, and elsewhere, several of these being connected by good roads. In 1884 the African International Association replaced the committee, and in the following year it secured the foundation of the Kongo Free State and the recognition of its independence by the Congress of Berlin. Trade and navigation on the Kongo and all the rivers, lakes, and canals connected with it were declared absolutely free, and the suppression of the slave-trade was provided for. Leopold II. was made sovereign, and Brussels was named as the seat of the government. In 1889 Leopold bequeathed his sovereign rights to Belgium. In 1890 the territories of the State were declared inalienable, and in that year also the right was reserved to Belgium of annexing it after 10 years. This convention expired on 3 June 1903, when the Belgian government decided to abandon the project of annexation, allowing the option to expire, the reasons given being popular opposition and the attitude of Great Britain. The central government, located at Brussels, comprises the king of the Belgians as sovereign, and a secretary of state, etc. At Boma there is a governor-general, under whom of course there are numerous officials. There is an army of native Africans, having an effective strength of about 16,000, com-

manded by European officers. Besides Boma, the capital, the chief stations are Banana, Matadi, Vivi, Isangila, Manyanga, Leopoldville, Mswata, Kwamouth, Bolobo, Lubolela, Equatorville, Bolombo, Stanley Falls, Nyangwe, Yambuya, Basoko, Benabendi, etc. Pop. estimated at from 14,000,000 to 30,000,000; number of Europeans (1898) 1,678—mostly Belgians.

Kongo, or Congo, River, Africa, a large river in southwest Africa, flowing into the Atlantic Ocean in lat. 6° S.; lon. 12° 40' E. Its estuary was discovered by the Portuguese, Diego Cam, in 1482; and the lower part of its course was first explored by Capt. Tuckey in 1816. The upper part of the river remained unknown till Stanley, by descending from Nyangwe on the Lualaba to the mouth of the Kongo (1876-7), proved the two rivers to be identical. The Kongo is formed by the junction of the Luapula and the Lualaba in about the same latitude as the mouth. Of these the former issues from the south end of Lake Bangweolo, bends northward, and flows into Lake Moero, on leaving which it pursues a northwesterly course. The chief inflowing river of Bangweolo is the Chambesi, which enters the lake on the east after flowing southwest from the mountains of northeastern Rhodesia. The Lualaba rises by several headstreams in the south of Kongo Free State and flows north and north-northeast through a series of lakes to its junction with the Luapula. The river thence flows north and slightly west to Nyangwe, receiving the Lukuga on the right from Lake Tanganyika, thus being connected immediately with the great lake system of Central Africa. It then follows a northerly course for about four degrees, near the equator turns to the northwest and holds that direction till it reaches about lat. 1° 45' N., when it turns first west and then gradually southwest. About the place where the river first crosses the equator there are seven falls, called Stanley Falls; and about lon. 17° E. and lat. 2° 30' S. there begins a series of cataracts and rapids. In this part of its course it receives some very large tributaries, the most important of which are the Aruwimi, the Rubi, the Mongalla, and the Mobangi (or Ubangi), which join it on the right, and the Boloko, Lopori, Ikelemba, Ruki, and Kwa, which join it from the left, the latter representing the collected waters of the Kassai, the Kwango, Sankuru, etc. Below the Livingstone Falls, near Stanley Pool, the course of the river, which is there contracted, again expands, till at its mouth it attains a breadth of 10 miles. It is navigable for about 110 miles from its mouth up to the cataracts, and above Stanley Pool steamers ply for about 1,000 miles. The amount of water which the river discharges is greater than that discharged by the Mississippi, the volume of water being next to the Amazon. The length of the river is estimated at 3,000 miles, and the area of its basin is about 1,600,000 square miles. Consult: Stanley, 'Through the Dark Continent' (1878).

Kongo-snake, one of the slender amphibians of the family *Amphiumidae*, which take an intermediate place between the cocilians and the salamanders as the lowest family of the tailed (urodelous) amphibians. Several genera occur in Asia and North America. The giant "salamander" (*Cryptobranchus maximus*) of the mountain-streams of Japan sometimes more than

KÖNIGSBERG—KOOKAS

five feet long, and the American hellbender (q.v.) are of the same family. The term "Kongo-snake," however, belongs specifically to the typical genus and species, *Amphiuma means*, which inhabits suitable localities in all the warmer parts of the United States, where it receives its name from the negroes of the Southern States. It is an eel-like creature, with very small, three-toed and almost useless limbs, one pair near the head and the other almost at the caudal extremity, which haunts shallow stagnant waters, is numerous in the southern rice-fields, and is superstitiously feared by many persons although perfectly harmless. It feeds on small fishes, snails, crayfish, insects, etc., which it darts upon in the water or roots out of the mud. It reproduces by eggs, deposited at the end of the summer in a damp place, as under a rotting log, which, provided with shells, are connected by a gelatinous cord, and are protected by the female who coils her body about them and afterward takes care of the young. The embryos have well-developed external gills, but these disappear with growth, and even gill-clefts are greatly reduced in adults.

Consult: Cope, 'Batrachia of North America' (1889); Gadow, 'Amphibia and Reptiles' (1901).

Königsberg, kén'igz-bérg, Prussia, a seaport town, capital of the province of East Prussia and of the government of the same name, on the Pregel, about $4\frac{1}{2}$ miles above where it enters the northeast extremity of the Frische Haff. It was once the Prussian capital, and the residence of the electors of Brandenburg, and still is a residence of the sovereigns and the place of coronation. It is surrounded by ramparts and detached forts. The larger part of the town is on the north bank of the Pregel, on hilly ground, a feature being an ornamental sheet of water with richly wooded banks, called the Schloss-Teich (Castle Pond). The older portion is divided into three parts—Altstadt, or Old Town, on the west, Lobernicht on the east, and Kneiphof, on an island of the Pregel. The town, provided with electric street railroads, has on the whole a modern appearance. The principal public buildings are the cathedral, begun in 1333, an interesting Gothic structure, situated in the Kneiphof; a new Gothic church in the Altstadt; the Haberberg Kirche, a conspicuous church in the southern portion of the city; the Schloss, or palace, a large building, containing apartments for the royal family, once the residence of the grand-masters of the Teutonic Order; the Schlosskirche, occupying a wing of the palace, in which Frederick I. in 1701 and William I. in 1861 placed the crown on their own heads as kings of Prussia; the old citadel of Fredericksburg; the handsome exchange, of recent erection; the university, founded in 1554 by the Margrave Albert, and hence called the Albertine, attended by 800 to 900 students, accommodated in handsome new buildings in the Renaissance style, and having connected with it a library of 220,000 volumes, a zoological museum, etc.; an observatory which the labors of Bessel have rendered famous, a botanical garden, a conservatory of music, museums, an ecclesiastical seminary, and other superior schools; town-house, law-courts, post-office, provincial government buildings, a theatre, a lunatic asylum, an infirmary, and several hospitals and benevolent endowments. The town contains other valuable libraries in addition

to that of the university. The manufactures include machinery and iron castings, woolen cloth, yarn and thread, leather, sail-cloth, copper, steel, and ironware, chemicals, tobacco and cigars, pasteboard, vinegar, articles made of amber, earthen and stone ware, liqueurs, and artificial mineral waters. There are also breweries and distilleries, and some ship-building. Large vessels bound for Königsberg stop at Pillau, which is considered its port. The principal exports are grain, flax, hemp, oil-cake, bones, timber, etc. Königsberg is the seat of many important provincial courts and public offices. It was founded in 1255. In 1365 it became a member of the Hanse League; was the residence of the grandmaster of Teutonic knights from 1457-1528; in 1626 was surrounded with walls; in 1657 it received a strong additional defense in the citadel of Fredericksburg, though the object of the margrave who built it is said not to have been so much to defend the town as to overawe its citizens. It suffered much during the Seven Years' war and from the French in 1807. Pop. (1900) 189,483.

Koo-cha-bee, koo-chä'bē, a food prepared formerly by the Indians from the dried pupæ of certain flies of the family *Ephydriidae*, which form in the water of some of the lakes of northern California and Nevada, and drift ashore in vast numbers in midsummer. They are dried, ground into meal, and baked into edible cakes. A similar food is obtained in Mexico by gathering the eggs of another aquatic fly of the same family, and is called "ahuatle."

Koo'doo, one of the largest species of antelope (*Strepsiceros kudu*), originally found throughout the entire southern and eastern parts of Africa but now nearly extinct in Cape Colony. The males bear great, rough, twisted horns nearly four feet long, and wound in a wide, open, spiral of about two turns; the females are hornless. Both sexes have short hoofs, a fringe of rough hair along the middle of the back and a similar one on the throat; and are marked with narrow vertical stripes on the flanks, a spinal band, and a chevron on the face, all of white. The koodoo lives in pairs or small parties in thick forests, especially on the rough hilly districts of Nyasaland. In many districts it has been decimated by the hide-hunters. A smaller species (*S. imberbis*) inhabits the low bushy countries of Somaliland and the Kilima Njaro region.

Kookas, koo'kaz, or **Kukas**, a sect of fanatical Hindus in the Panjab, which originated after the annexation of that territory to British India (1849), in consequence of jealousy of the equal political rights granted to the Mohammedans of that region under British rule. They are a body of reformers of extreme views, and are hence regarded with as much hostility by orthodox Sikhs as they are by the Mohammedans, whose rights they are anxious to invade. The chief right conceded to the Mohammedans by the British government of India, and objected to by the Kookas, is that of killing cows, which are regarded as sacred animals in the Sikh religion; and it was mainly this practice that led to the consolidation of the most violent and fanatical adherents of the Sikh religion into a distinct sect. Their number has been variously estimated at from 50,000 to 800,000. In 1871 they were incited to attack and massacre the

KOOSOO — KORAN

Mohammedan butchers who killed cows in different parts of the Panjab, but they were quickly suppressed by the British government.

Koo'soo, or Kosin, a bitter drug prepared from the dried flowers of an Abyssinian plant (*Brayera anthelmintica*), which contains much tannin, and is used as a vermifuge.

Kootenay (koo'tē-nā) River, a tributary of the Columbia, rising in British Columbia. It is 400 miles long. After flowing south into Montana and Idaho it again enters British Columbia.

Kopisch, August, ow'goost kō'pish, German poet and painter: b. Breslau 26 May 1799; d. Berlin 3 Feb. 1853. He studied art in the Prague Academy (1815) and in Vienna. From 1819 to 1822 he continued painting, when an injury to his hand disabled him, and he started on travels through Italy, and in Rome and Naples applied himself to the study of local poetry and archaeology. It was he who discovered the famous 'Blue Grotto' or 'Grotto of the Nymphs' on the island of Capri. He returned to Germany in 1823, and received the title of professor in Berlin. He removed to Potsdam in 1847 and occupied himself in writing an account of the royal castles there and in the neighborhood. Most of his pictures are mere sketches. His witty poems, clever stories, and translations, including one of Dante, are all included in his 'Gesammelte Werke' (1856).

Kopitar, kō'pē-tär, Bartholomæus or Jernej, Austrian philologist: b. Carniola, Austrian Hungary, 1780; d. 1844. He was educated at the German gymnasium of Laibach, and completed his studies at Vienna, where he became curator of the imperial library. In 1814 he set out on his travels through Europe, his tour embracing Germany, England, Italy and France, to which last country he went with the special mission of recovering the Slavic manuscripts carried off by the French in 1809. His contribution to philological science consists in pioneer work in Slavic grammar. His principal works are: 'Grammatik der slawischen Sprache in Krain, Kärnten, und Steiermark' (1808); 'Glagolita Clozianus' (1836); and 'Hesychii Glossographi Discipulus Russus' (1839).

Kopp, Georg, gā'ōrg kōp, German cardinal and statesman: b. Duderstadt 27 July 1837. He was the son of a poor weaver and attended the gymnasium at Hildesheim. In 1856 he became a telegraph operator in the employ of the Hanoverian government. From 1858 to 1861 he studied theology and in 1862 entered the priesthood. He rose rapidly in his profession and in 1872 was made vicar-general at Hildesheim and three years later bishop of Fulda. His reasonable ultramontanism was exercised in bringing about a better understanding between the German government and the papal curia. Being elected member of the house of lords he obtained a mitigation of the harsh provisions which characterized the May laws. In 1887 with the approval of the Prussian government the pope appointed him prince-bishop of Breslau, and in 1893 he was made cardinal.

Kopp, Joseph Eutychius, Swiss antiquarian: b. Beromünster, Canton of Lucerne, 25 April 1793; d. Lucerne 25 Oct. 1866. He studied theology and philology in Lucerne and Freiburg, and in 1819 was appointed professor of

Greek in the Lyceum of the former town. While serving in the legislative body of the republic, he was led as a "conservative Catholic" into such bitter controversy with the Jesuits, that in 1845 he was compelled to retire into private life and undertook a tour by way of Vienna to Rome, for the purpose of examining such archives as might throw light upon the history of his native country. He was elected corresponding member of the Academies of Berlin and Vienna. Self taught as he was, he became the Niebuhr of Swiss history, and proved how her true annals had been obscured by such legends as those of William Tell, etc. Among his chief publications are 'Geschichte der Eidgenössischen Bünde' (1862); 'Geschichtsblätter aus des Schweiz' (1856); 'Dramatische Gedichte' (1866).

Köppen, Peter Ivanovitch, pā'tér ē-vän'ō-vich kep'pēn, Russian archæologist: b. Khar-kov, Russia, 19 Feb. 1793; d. Karabagh, Crimea, 4 June 1864. He was educated at the University of Khar-kov and subsequently traveled widely in order to procure historical and archæological material for his work. The outcome of his investigations, written in German, is comprised in the reports of the Academy of St. Petersburg, but among other works of his are: 'Kulturgeschichte Russlands' (1825) and his famous 'Ethnographical Map of European Russia' (1851).

Koran, kō'rān or kō-rān' (Ar. *quran*, *qoran*, reading, from *qara*, read; with the Arabic article, *Alkoran*; also called *Furkan*, salvation, *Al-Mushaf*, the volume, *Al-Kitab*, the book, *Al-Dhikr*, the reminder or the admonition), the sacred scripture of the Mohammedans, written in Arabic and professing to be the revelation of Allah (God) to Mohammed. It contains a code for the government of all Moslem transactions, and is accepted by true Mussulmans as uncreated and eternal. According to orthodox Mohammedan belief it was written from the beginning in golden rays on a magnificent tablet in heaven, and was communicated to Mohammed on the night of Al-Kadr, in the sacred month of Ramadan, by the angel Gabriel, chapter and verse as they stand, on parchment made of the skin of the ram which Abraham sacrificed instead of his son Isaac, in a volume ornamented with precious stones, gold, and silver from paradise. Other traditions are different, one being that Mohammed was assisted in composing it by a Persian Jew and a Nestorian monk. Its revelations cover Mohammed's entire prophetic career, 610-632 A.D. It is the first work known in Arabian prose, its scattered discourses being preserved on stones, palm-leaf ribs, leather, etc. Except in a few instances, Allah is the speaker. Mohammed named the book at the time of imparting the first revelations, and the name was retained for the collection when this was made in 633 by Zaid, son of Thabit, under direction of Abu-Bekr, father-in-law of the prophet. The authorized text, ever since accepted, was produced under the caliph Othman, 650 A.D., from the fragments, originally thrown together without order, and afterward gathered in a volume with no attempt at arrangement, not long after Mohammed's death. In order to free the book from various readings, Othman commanded the destruction of all other copies, and in purity of

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text the Koran stands alone among religious scriptures. The chronological order has never been clearly determined, and many conjectural rearrangements and subdivisions have been made by Mohammedan and other scholars.

In size the Koran is nearly the same as the New Testament; it is divided into 114 suras or chapters, each beginning: "In the name of God"; the suras have various subdivisions. The Koran is dogmatic throughout; from beginning to end it is dominated by the positive keynote: "There is no doubt in this book." Its author was indebted to many other writers. Of the sacred writings of the Jews he directly cites only the Pentateuch and the Psalms; of the New Testament, with which internal evidence shows him to have been acquainted, he cites nothing; but besides the religious writings of the Jews and Christians he knew the systems of the Magians, the Sabians, and other sects, from whom he derived many materials to be incorporated in a new religion for his own country, where numerous and diverse faiths already existed.

Mohammed lived much in solitude, meditating on his mission and his doctrine; he did not reject the teaching of any sect; asserted his desire to restore the purity of the true faith; announced as his fundamental doctrine the unity of God. This idea, together with conceptions of divine might, sovereignty, compassion, and other attributes of Godhead, is all-pervading in the pages of the Koran; "God is God," it declares, "and Mohammed is his prophet." He felt that the unity of God had been the essential doctrine of all true religion, in which custom and ceremony were but accidents. "We make no difference," he says, "between that which God has taught us and that which Abraham, Isaac, Ishmael, the twelve tribes, Moses, and Jesus have learned from the Lord." "God commands thee to receive the religion which he prescribed to Noah, which he has revealed unto thee, and which he imparted to Abraham, Moses, and Jesus." To Jesus Mohammed assigns a place in the seventh or highest heaven, in the immediate presence of God.

The Koran dwells much on the resurrection and the last judgment, setting these forth somewhat after the manner of the Apostle Paul: "When the trumpet sounds the second time, they shall rise quickly from the graves to appear before God." "A sound of the trumpet of judgment will assemble all men before my throne, and every one shall there receive the reward of his deeds." In its presentation of the last judgment the Koran resembles the teachings of the Jews and the Magians; in the passage of the narrow bridge to paradise—Al-Sirat, over the abyss of hell, finer than a hair, sharper than a razor; in the book wherein all the actions of men are set down, and the scale in which they are weighed. Quite Jewish and Magian also are the Mohammedan views of paradise. The doctrine of predestination as contained in the Koran was successfully employed by Mohammed to encourage his followers in the face of every trial and danger. Herein he probably availed himself of beliefs already widely held, especially among the Sabians, with their worship of intelligences supposed to reside in the heavenly bodies, controlling the lives of men and the course of events, and by the Magians, who held a system of dual-

ism, the influence of these beliefs having exerted itself upon the Arabians.

In the matter of religious exercises Mohammed largely adopted such as he found, to those which were narrow or vague, giving more of universality and precision. The Koran prescribes prayer, fasting, alms, and the pilgrimage to Mecca; prayer embraces ablutions, purifications, and all other exercises needful to preparation for it; to those who sought to be relieved from these observances Mohammed replied, "Religion without prayer is nothing"; prayer he calls "the key to paradise." Surpassing the severity of the rabbis, he prescribed prayer five times a day, with the face of the suppliant turned toward Mecca. To give alms was always an Arabian practice, but the Koran makes it obligatory. Concerning polygamy, divorce, inheritance, etc., it follows the law of Moses and the decisions of the rabbis, adapting them to the prejudices and customs of the prophet's people; it forbids few of the old practices save idolatry; "God," it says, "intended that his religion should be easy, else, as he well knew, you would only become hypocrites."

Although the Koran is written in prose, the different parts of a sentence end in rhymes, and there is marked diversity of style, yet withal an impressive unity, characterized by a free and forcible eloquence unequaled in any other Arabic writings. The earlier utterances of the prophet seem often to be outbursts of unbridled imagination, though still the solemn words of prophetic earnestness proclaiming God with power to reach and sway the hearts of men. In later portions of the book the tone takes more of calmness; imagination is subdued; the author dictates extended passages to be taken down by his hearers. The highest elevations are where he speaks of the greatness of God and describes the last judgment, the pleasures of paradise, and the pains of hell.

The moral precepts of the Koran exhibit a lofty feeling of humanity and a profound sense of ethical law reduced to most practical forms. They inculcate all the noblest virtues and pieties—obedience to divine commandments, charity, humility, mildness, temperance, toleration, and the strong virtues of courage, faith, and justice. To death in the cause of religion it ascribes a peculiar merit. The influence of this book through many centuries and among many peoples has been vast, and it still controls the lives of a great portion of the human race. "From the Atlantic to the Ganges," says Gibbon, "the Koran is acknowledged as the fundamental code, not only of theology, but of civil and criminal jurisprudence; and the laws which regulate the actions and the property of mankind are guarded by the infallible and immutable sanction of the will of God." The divinity and authority of the Koran have at times been assailed among Mohammedans themselves. The first serious heresy, about 740, was suppressed by the execution of its chief author, but appeared again in the next century, and was not finally crushed out until 842, when Harun II. prohibited all discussion regarding the character of the Koran, which has since been everywhere held by Mohammedans in admiration as the great Arabian classic, and in reverence as the book of religious authority. Once each day it is read through in the mosques of the Sultan and in the adjoining chapels. By the faithful

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it is never carried below the girdle; not without their own purification may they even touch it; and on walls, doors, banners, etc., its texts are frequently written.

Commentaries on the Koran are almost innumerable. The library of Tripoli, in Syria, is said to have contained no less than 20,000 of them. Many editions have been published in different countries. For English readers that of Sale (1734), with its comprehensive introduction, covering all the important aspects of Mohammedanism, is still of prime value. The translation of E. H. Palmer's (1880) is authoritative, as is also that of Rodwell (2d ed. 1876). Several versions in German have appeared in which it was attempted to reproduce the rhyming style of the original: J. von Hammer's (1811), A. Sprenger's (1861-5), Fr. Ruckert's (1888), and M. Klaproth's (1890). Other editions which have their special values are Hinkelmann's (1694), Maracci's (1698), and Flugel's (1883). Consult: Sprenger, 'Leben und Lehre des Mohammed'; Kremer, 'Herrschende Ideen d. Islam'; Braun, 'Gemälde d. Islam'; Deutsch, 'Islam'; Dozy, 'L'Histoire d'Islamisme'; Muir, 'Life of Mahomet and History of Islam'; Gibbon, 'Decline and Fall,' ch. L.; Irving, 'Mahomet and his Successors'; Carlyle, 'Heroes,' 'The Hero as Prophet'; Lane, 'Selections from the Koran'; Johnson, 'Oriental Religions: Persia,' sec. "Islam"; Conway, 'The Sacred Anthology' (for many good extracts from the Koran); Hirschfeld, 'New Researches into the Composition and Exegesis of the Koran (Eng. trans., 1902). See ISLAM; MOHAMMED; MOHAMMEDANISM.

Ko'ras. See HOTTENTOTS.

Kordofan, kör-dō-fän', a province of Egyptian Sudan in lat. $12^{\circ} 30'$ and $15^{\circ} 30'$ N.; lon. $29^{\circ} 20'$ and $31^{\circ} 30'$ E.; between the White Nile and Darfur. The surface is generally flat and the soil naturally fertile. The principal articles of export are gum, hides, and senna leaves, all monopolized by the government as most lucrative; ivory, cattle, tamarinds, ostrich eggs and feathers, gold, salt, slaves, etc.; the imports spices, sugar, coffee, sulphur, rice, soap, cotton and linen cloth, etc. From 1821 onward Kordofan was subject to the Viceroy of Egypt, the country having been subdued by Mehemet Ali. In 1883 it took part in the successful Mahdist revolt, but was regained for Great Britain and Egypt in 1898. Pop. about 300,000, chiefly Arabs.

Korea, or Corea (from the native pronunciation of Chinese Kao-li—see *History*; Li Tan in 1392 revived the old name Cho-sen or Cho-són, Chinese "morning freshness" or "dawn-land"—that is, "the east"; in 1897 the official name was made Dai Han). An Asiatic kingdom northeast of China, comprising a strip of coast and a peninsula projecting southward from Manchuria, divided from it by the great valleys of the Yalu or Amnok southwest and the Tuman northeast, both rising in the colossal peak of Paik-tu (White Head), 8,300 feet high. The Japan Sea divides it from Japan, whose southernmost island (Kiushiu) approaches its southern tip within 100 miles, separated by Korea Strait with large islands midway; to the west, Korea Bay and the Yellow Sea, marked off by Shantung peninsula, divide it from China. A dense archipelago fringes it south and west. Its parallels

are from $34^{\circ} 17'$ to 43° N., or about the same as from Concord, N. H., to Wilmington, N. C., and average much south of Ital'y; its meridians, $124^{\circ} 38'$ to $130^{\circ} 30'$ E. It is about 600 miles long by 135 broad; area 80,000 to 90,000 square miles. Population probably 15,000,000 to 20,000,000.

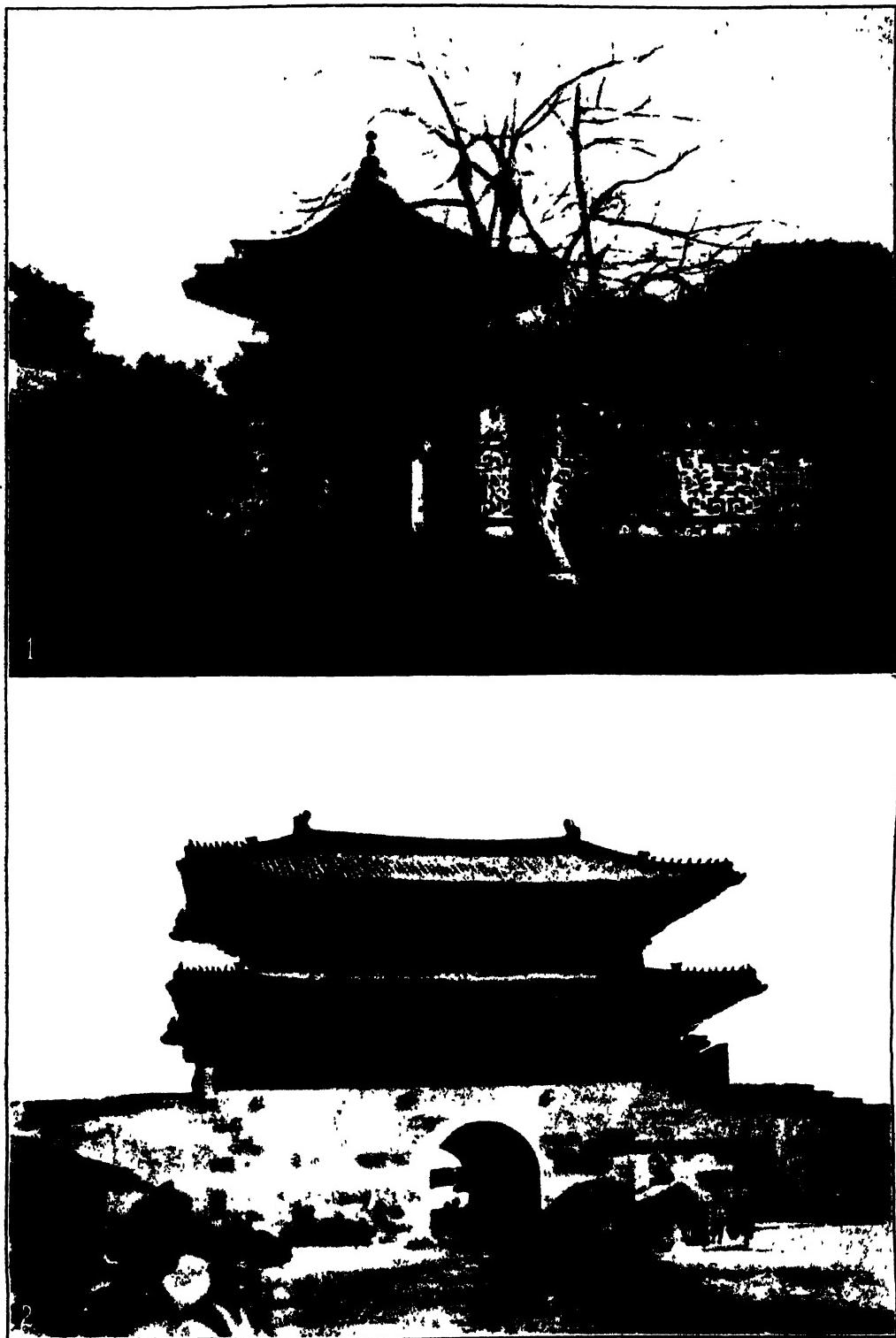
Korea is traversed north to south by a mountain backbone of striking individuality: a perpetual zigzag, skirting the eastern shore with slender coast-lands, in a steep solid wall unbroken for hundreds of miles save by Yung-hing or Broughton's Bay at the northern neck. In the north it has summits 4,000 to 8,000 feet high, and at Cape Pelissier, about lat. 37° , culminates in Mt. Popoff (4,800 feet); thence the main chain turns southwest, and ends in the extinct volcano of Mt. Auckland (6,700 feet), on Quelpaert Island, while to the east it throws out low hills and plateaus. The islands of the southern archipelago, verdant rocks worn into the semblance of fantastic castellated ruins, are the ends of its spurs. On the eastern side the ridge is timbered to the summit; on the west almost treeless, and seamed with deep ravines shallowing out into broad fertile plains, occupying most of Korea. On the east below the boundary there is but one river of any size, the Nak-tong along the southeastern uplands, and almost no islands; the west has 10 considerable streams, and the coast is thickly notched with harbors and fringed with fertile islets.

The chief rivers are, from the north: The great Yalu or Amnok, a mile wide and rising 40 feet in flood, navigable 30 miles for seagoing junks, and 175 for boats, to Wi-wön. Opposite it the Tuman. The Tai-dong or Ta-tong, navigable for boats 75 miles to Ping-yang. The Han ("the river"), rising on the western slopes of the eastern ridge but 30 miles from the Japan Sea, draining nearly the whole breadth of the peninsula with two main arms, and flowing into a bay of the Yellow Sea among islands. About 30 miles up lies Seoul, the capital, and a line of small steamers runs between it and Chemulpo, on Imperatrice Gulf as much farther south; boats ascend nearly 100 miles more. The Nak-tong (above) empties into Korea Strait near Fusan, and is navigable 140 miles for vessels drawing $4\frac{1}{2}$ feet. The best harbors are Gen-san and Port Lazareff, on Broughton's Bay; the best on the south coast is Fusan on Korea Strait. The tides on the west and south are very high and rapid, often leaving vessels stranded on mud banks.

The climate is much like that of the eastern coast of America in the same latitudes; the north and centre have very hot summers and severe winters; the south is like the Carolinas, and tempered by the ocean breezes. The Han is frozen in winter so that at Seoul, where it is 400 yards wide, is available for cart traffic three months of the year, from December to February. The rainfall averages 36 inches, 22 in the crop season. A fall of only 4.1 inches in 1901 created a famine.

Flora and Fauna.—There is a great variety of excellent hardwood timber on the east slopes and the northern mountains; in the west it is scarce and sparingly used; lack of coal has caused much wasteful denudation in other parts. The one surpassing animal of the native fauna is the man-eating tiger, who fills the native proverbs and literature, depopulates whole vil-

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1. Round Gate, on the Palace Grounds, Seoul

2. Big East Gate, Seoul.

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laces, and even besieges houses for days, sometimes leaping on the thatched roof and tearing his way down through. Besides him there are leopards, tiger-cats, and foxes; deer, beaver, badgers, otters, martens, etc., and a great variety of birds.

Products.—The great native crop is ginseng, which grows wild in the Kange Mountains, and is extensively cultivated about Kai-seng; it is a government monopoly, and despite much smuggling, yields some \$500,000 a year, or a ninth of the state revenue. Among other products are rice, wheat, millet, sesame, Indian corn, beans, cotton, hemp, and perilla (for oil and pigment). The domestic animals are few. The cattle are excellent, the bull being the usual beast of burden; the ponies very small but hardy, fowls good, pigs inferior. Iron ores of excellent quality are mined; and there are copper mines in several places. In 1886 the value of gold exported was \$503,296; the silver output is very small. Three fourths of the trade is with Japan, and over four fifths of the remainder with China.

Government.—This is a hereditary absolute monarchy: till 1895 tributary to and receiving investiture from China, and like it in administrative forms, with officials appointed by examination in the classics. On the declaration of independence (see *History*), the entire system was abolished, as well as the privileges of the aristocracy, and a cabinet of 10 ministers in charge of different departments formed, who with five councillors form a grand council of state to lay measures before the emperor. Till 1896 the country was divided into eight *do* or provinces; it was then redivided into 13, including a metropolitan province around the capital. These are divided into 339 *kun* or prefectures, 7 under *pu-yan* or city governors; 4 treaty ports are under *kamni* ("trade overseers"), ranking with consuls. The revenue is about \$4,500,000 a year. The standard is gold, and a native coinage is made, supplemented by Japanese paper and coin. The weights and measures are the same as the Chinese. There is an army of 17,000 men with foreign training and equipments, and a bodyguard of 1,000, but no navy.

Social Conditions and Education.—The usual dwellings are mud hovels thatched with straw, and the conditions of life for the masses, as in China, are hard and squalid; but actual distress is rare and beggars are few. Caste till recently was iron-bound, and no offices of even local importance could be held by other than nobles, who are distinguished by colored clothing and horsehair hats. Women are secluded; concubinage is allowed, but only one legal wife at a time. The immemorial system of education was almost wholly in Chinese, which contained the only written memorials needing it, and was of Chinese classics. But in 1894-5 a department of education was established, and a thoroughly graded public-school system, including normal training. There are also schools of foreign languages taught by speakers of the languages.

Religion.—See *History* for the vicissitudes of Christianity. There are now about 30,000 Roman Catholic and 2,500 Protestant natives. The popular religion is the degraded Shamanism (q.v.); the higher classes are Confucians; the anciently all-powerful Buddhism, crushed by

the revolution of 1392, is slight and uninfluential, with a few ignorant monks.

Population.—The people are a mixed race of disputed elements, apparently Mongoloid and Aino with Manchu and Malayan infusions. As in all Eastern countries, where a census means a tax and conscription list (see *CENSUS*, par. 1), no accurate statistics can be had. An official census of adult males liable to tax in 1900 was 5,608,351; which must mean toward 20,000,000 total population, enormous as the figure is for an agricultural people on this size of territory. Foreign population 21,783, including 16,142 Japanese and about 5,000 Chinese.

The chief cities are Seoul (Han-yang), the capital, estimated at over 200,000; Ping-yang, perhaps 40,000; and Kai-seng. A trolley line nine miles long, built 1899, is operated in Seoul by Americans.

History.—The traditional founder of Korean nationality is the Chinese noble Ki-tse, who left China with 5,000 followers 1122 B.C., and established a kingdom with capital at Ping-yang. The first authentic history is the annexation to China 108 B.C. A century or so later it split into three princedoms, of which, about 960, Koryu (Kao-li) came to the front, probably from borrowing the higher Chinese civilization. It recast the administration upon the Chinese model, introduced Chinese methods and arts, and initiated several centuries of brilliant progress and prosperity, enriched by art and literature. Buddhism was the paramount religion, and developed a powerful and rigid ecclesiastical hierarchy. As a result, a Protestant movement took place, and in 1392 a revolution headed by Li Tan founded the present dynasty and expelled the priests. The capital (*seoul*) was fixed at Han-yang. When the Manchu power began to rise in the 15th century, China, to protect herself against its ravages, desolated a strip of fertile territory many thousand square miles in extent, then or early in the 17th century destroying four cities and many villages and removing 300,000 inhabitants; and down to 1875 this zone of 60 miles wide by 300 long was kept as a permanent buffer between China and Korea. During the rise of the Japanese shogunate out of the 16th century anarchy, Hideyoshi, as a preliminary to invading China, sent an army into Korea, rapidly overrunning it. But Korea is like Spain, easy to conquer and impossible to hold; and the stolid resistance of the natives, with the Chinese armies, gradually forced the Japanese out of the peninsula six years later, retaining Fusan on the southeast coast as a trading station. Thirty years later the Manchus, previous to their conquest of China, invaded it and exacted a tribute, which was continued to the Manchu dynasty in China; in 1653 it was reduced to a third, and for generations down to 1894, when it was finally abolished, had been only nominal, as an acknowledgment of Chinese supremacy and a trading license. But the Chinese wisely attempted no permanent occupation.

Korea had always as intense a determination to seclude herself from foreign influences as ancient Egypt, and practically the first knowledge obtained of it by modern Europe was through the shipwreck of some Dutch on the coast in 1653, though the Jesuit missionary Cespedes had entered it in 1594. In 1784 new missionaries came and planted Christianity in the peninsula,

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despite steady persecution; in 1835 the French missionaries reinforced them. But in 1864 came a fiercer blast. The then king died childless, and his oldest widow set aside the natural successor, her nephew, and nominated Yi-Hevi, the present king—the 12-year-old son of a royal prince, Ni-Kung, whom she made regent. The latter was a savage reactionist, and let loose fire and blood to extirpate the foreigners, rigidly excluding all new ones. A futile French expedition was sent against him in 1866; the same year a stranded American schooner, the General Sherman, was burnt and her crew murdered in sight of Ping-yang. An American expedition sent in 1871 had no success. Meantime several nations were attempting to force Korea into treaties of commerce and gain trading privileges, but Japan was the first to succeed, having the ports Gensan and Fusen opened in 1876, and Chemulpo in 1880. Meantime the "neutral strip," for many years a nest of brigands and pirates, was abolished by Li Hung Chang in 1875. In 1882 Commodore Shufeldt negotiated a treaty of friendship between the United States and Korea, and thence on, other nations were rapidly admitted—Great Britain and Germany in 1883, Italy and Russia in 1884, France in 1886, Austria in 1892, and China in 1897.

The flood of new ideas and habits aggravated the conflict between the progressives and the reactionaries, in which the former won, and Korean embassies began to visit other countries,—Japan in 1880, the United States in 1883. The nativists raised an insurrection in 1884. The greatest breach with the past, however, was the result of the Chinese-Japanese war of 1894-5, one of the pretexts of which was the action of China in assuming the ancient suzerainty over Korea. It was at Ping-yang that the first heavy defeat was inflicted on the Chinese, and off the Yalu River that the Chinese fleet was destroyed. On 8 Jan. 1895 the king of Korea proclaimed its independence, and the Chinese Gate at Seoul was publicly destroyed with impressive ceremonies. The Treaty of Shimonoseki was then made with Japan; and Korea has become a "sphere of influence" for the Japanese, who will not let it mold in antiquarian ideas. The present conflict, however, is not between Japan and China in the control of Korea, but between Japan and Russia, the latter needing southern ports for her Pacific empire, the former thinking that Russian control of her neighbor means the permanent crippling of her naval development—in which the history of England might reassure her. In 1897 the king proclaimed the country an empire, named it Dai Han, and took the title of emperor.

Language.—Korea since early times has employed two languages: Chinese for writings and native Korean for speech, Chinese if spoken being an acquirement like French in America. The literature in Chinese is sometimes translated into Korean, however; and the recent Korean declaration of independence has produced a revival of appreciation for the native tongue, as with so many other nations from like causes. The reforms of 1897 were proclaimed in the vernacular.

Korean is of a not extreme agglutinative type, belonging to the polysyllabic branch of the Mongol-Tartar languages like Japanese, and unlike the monosyllabic Chinese; it is structurally

unrelated to the latter, though it has very many Chinese loan-words, pronounced after its own phonology. Its resemblances to Japanese are far closer: mutual translations word for word, and even particle for particle, are quite feasible. The particles and grammatical terminations in both represent punctuation, emphasis, and inflection of nouns and verbs. The honorific vocabulary—almost a complete ceremonial language even in construction, to express relations between superiors and inferiors, and equals—is common to both. The differences are mainly euphonics: Korean vowels are heavily assimilated to those which follow, the syllables need not end with a vowel, and the spelling is as irregular as English, none of which is true of Japanese.

The grammar of Korean is extremely flexible and pregnant; like Chinese, the roots are invariable. There are no inflectional forms for number, person, or case, or conjugation of verbs, and no form for gender; all are indicated by particles without meaning, or whose meaning has been lost, affixed to the stem, and varying with its terminal letter, as consonant, vowel, or liquid. There are no pronouns of the first and second person; the third, with relational particles, serving for both. Development has depended itself on the verbs, which are marvels of varied, flexible, and ingenious expressiveness. Many words not primarily verbs can be turned into them (as in English), and these with the true verbs constitute 20 per cent of the entire vocabulary. The grammatical forms of the verb are said to average 300. Adjectives and adverbs are not distinguished from the verbs, and the prepositions are verb forms. All conditions expressed by inflections in Western languages—present, continuing, past, unfinished or completed, optative, subjunctive, potential, interrogative, participial, etc.—exist in Korean, and a vast number of others expressed by us in long sentences. Some verbs have no passive, but all have a negative voice. There is no number; the three persons in every variant are expressed by courtesy forms—one to or of superiors, one for equals, one for inferiors or of things. The syntax is positional, as with Chinese. The object precedes the verb or other governing word, the prepositions are postpositions, the adjective precedes the noun it qualifies and the adverb its verb or adjective (as in English). A dependent clause precedes its principal.

Korean has an alphabet of 25 letters, 14 consonants, and 11 vowels; a very simple and scientific one, analyzed by organs of speech. The vowels are a, ya, ü, yü, o, yo, u, yu, i, eu, ä; with the diphthongs e, e, e'. The consonants are—labials, p, ph, m; dentals, t, th, n, l; palatals, ch, chh, s; gutturals, k, kh; laryngeals (?) h, ng final. There are no letters f, v, w, b, d, g, j, or z, though (except the first, which is replaced by p) they exist in speech. There is but one character for l and r, and neither of them can begin a word, their place being taken by n. The characters—women and children's only, the true "learned" characters being Chinese—are of an extreme simplicity, contrasting strongly with the complex Chinese; and there is a cursive form. This alphabet is called *onmun*, "the vulgar"; and there is a system called *nido*, in which the letters are grouped in the 109 possible combinations and learned by rote. The writing is in syllables, in columns from right to left, as with Chinese.

By Courtesy of J. Stout Fassett.
THE CROWN PRINCE OF KOREA.
From late photographs presented to Mr. Fassett by the Emperor.



KOREN — KOSSUTH

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Ko'ren, John, American statistician: b. Decorah, Iowa, 3 March 1861. He was graduated from Luther College in his native town and from Concordia Theological Seminary, St. Louis, and has since been prominent in investigations of the liquor problem, in State and municipal employ. He has published: 'Economic Aspect of the Liquor Problem'; 'The Liquor Problem in its Legislative Aspects' with F. Wines (1897-8).

Körner, Karl Theodor, karl tā'ō-dōr kér-nēr, German poet: b. Dresden 23 Sept. 1791; d. 26 Aug. 1813. After studies at Freiberg, Leipsic, and Berlin, young Körner, through Kotzebue's influence, was appointed dramatist to a Vienna theatre, and wrote light comedies, such as 'The Green Mask' and 'The Night Watches,' and some tragedies, of which 'Zriny' was the most successful. In the uprising of the German nation against Napoleon, Körner not only displayed heroic personal courage in many encounters, but wrote numerous patriotic songs. These were published in 1814 under the title of 'Lyre and Sword.' The most famous of these pieces is the 'Sword Song,' composed only a few hours before the author fell in a skirmish, between Schwerin and Gadebusch.

Kosciuszko, kōs'-ūs'kō, Pol. kōs-choosh'-kō, Thaddeus (Polish TADEUSZ), Polish patriot: b. Mereczowszczyzna, Lithuania, 12 Feb. 1746; d. Soleure (Solothurn), Switzerland, 15 Oct. 1817. He was educated in the military school at Warsaw, and completed his studies in France. On his return to Poland he became suitor to the daughter of Sosnowski, marshal of Lithuania, but his love meeting no return he betook himself to America (1777). Having attracted the notice of Washington, he was appointed him engineer, with the rank of colonel, and afterward general of brigade. He performed excellent service and at the end of the war received the thanks of Congress, with the brevet of major-general. He returned to Poland in 1786, and on the occasion of the reorganization of the Polish army in 1789 was appointed major-general, and having declared for the constitution of 3 May 1791, he fought in the war which soon after broke out, with the rank of lieutenant-general. When Stanislaus Augustus in 1793 agreed to the second partition of Poland, Kosciuszko withdrew from the army and retired to Leipsic. At this time the legislative assembly in France conferred on him the

title of French citizen. When a new insurrection broke out in Poland for the purpose of delivering the country from the Russians in 1794 Kosciuszko was recalled and made commander-in-chief of the insurgent army. He defeated the Russians at Raclavice, but at the battle of Maciejovice his army was defeated, and he himself wounded and taken prisoner. He remained in captivity for two years, and he then proceeded to England, and thence to America. In 1798 he returned to Europe on a mission from Congress to France, and contributed to bring about an understanding between the latter country and the United States. In April 1814, he addressed a petition to Alexander I., emperor of Russia, requesting him to grant an amnesty to all expatriated Poles, to accept the title of King of Poland, and to give that country a free constitution similar to that of England, but the petition remained without effect. In April 1817 he issued a letter of emancipation to the serfs on his estate of Siechnovice, in Poland. His death was occasioned by a fall from his horse. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and a monument erected to him.

Consult: Lives by Falkenstein (1834), German; Chodzko (1837), French; Paszkowski (1837), Polish.

Kosciuszko, Mount, in Australia, one of the highest mountain peaks in the Muniong Alps, in New South Wales, near the frontier of Victoria. It is 7,308 feet high.

Kos'mos. See COSMOS.

Kossuth, kōs-sooth', Hung. kōsh'oot, Lajos (Louis), Hungarian patriot: b. Monok, Hungary, 27 April 1802; d. Turin, Italy, 20 March 1894. He came of a family of noble rank and of the Protestant religion, studied and practised law, and in 1832 entered the parliament of Pesth, becoming also editor of a newspaper circulated in writing. For persisting in publishing the parliamentary debates he was condemned to four years' imprisonment, but was released in 1840 before the end of this period. In 1841 he became editor of the Pesth 'Journal,' a paper that advocated very advanced views; and in 1844 founded the national league in opposition to the Viennese government. In 1847 he was elected to the Hungarian diet by the national party, and in 1848 became minister of finance in the Hungarian government. His influence had much to do in bringing about the revolution which followed, and in which he played the most prominent part, being appointed governor or dictator by his fellow-countrymen; but the intervention of Russia rendered all the efforts of the Magyars unavailing. He resigned his position in favor of Görgei (whom he accused of treachery), and in 1849 he found it necessary to take refuge in Turkey, where he was kept as a prisoner. Being released in 1851 through the influence of Great Britain and the United States, he soon after visited both these countries and was received in the most enthusiastic manner. He endeavored subsequently to induce Napoleon III. as well as Victor Emmanuel to act against Austria in favor of Hungarian independence, but without success. Though by the amnesty of 1867 he might have returned to his native land he did not do so, but lived chiefly in Italy, and was

KOTO — KRAFT

never fully reconciled to the union that had taken place between Austria and Hungary. His 'Memories of My Exile' appeared in English in 1880.

Ko'to, a Japanese musical instrument, having a long box, larger at one end than the other, and with a convex top over which 13 silk strings are strung and fastened tightly at each end, each string having a bridge. To tune the instrument it is necessary to move the bridges. The instrument is played with both hands like a harp.

Kotow, kō tow' or -tō', a Chinese form of obeisance; the ceremony of prostration, in which an inferior, kneeling, touches his forehead to the ground. Kotowing is unknown outside of China.

Kotzebue, August Friedrich Ferdinand von, ow'goost fred'rih fer'di-nand fōn kōt'-sē-boo, German dramatist and Russian official: b. Weimar 3 May 1761; d. Mannheim 23 March 1819. In 1781 he went to St. Petersburg, where, obtaining the patronage of the empress, he was made governor of Esthonia and ennobled. About 1800 he returned to Germany, and attacked Goethe and other great German authors who had refused to associate with him. In 1806 he went again to Russia, and lived from 1807 on his estate Schwartze, in Esthonia. In 1813, as counsellor of state, he followed the Russian headquarters, constantly writing to excite the nations against Napoleon. In 1817 he received a salary of 15,000 roubles, with directions to reside in Germany, and to report upon literature and public opinion. Kotzebue, who during the whole campaign had written in favor of the Russians, even at the expense of his native country, and had expressed the utmost contempt for liberal principles and institutions, was now odious in the eyes of most of his countrymen, and regarded as a spy. This feeling was so strong in the case of a young enthusiast named Sand, that he assassinated him as a traitor to liberty. Kotzebue wrote more than 100 plays, a history of Germany and other works, most of which are now forgotten. Two of his plays, 'The Stranger' and 'Pizarro,' are still performed on the English stage.

Kotzebue, Otto von, Russian navigator; second son of A. F. F. Kotzebue (q.v.): b. Reval 30 Dec. 1787; d. there 15 Feb. 1846. In his 17th year he accompanied Krusenstern in his voyage round the world. In 1815 he was appointed to the command of the ship Rurik, destined to ascertain the practicability of a northeast passage in the direction of Bering Strait. He discovered several groups of islands in the Pacific, and a large sound on the southeast of Bering Strait, which now bears his name; and returned after a three years' absence. The results of the voyage were published in a work called 'A Voyage of Discovery in the South Sea and to Behring's Strait in Search of a Northeast Passage' (1821-23). In 1823 he was commissioned by the Emperor Alexander to make a third voyage round the world. He returned in 1826, publishing the results of the voyage in a work which has been of great importance to hydrography, particularly that of the Pacific, 'Neue Reise um die Welt' (1830).

Kou'miss. See KUMISS.

Kuropatkin, Alexei Nikolayevitch, Russian soldier: b. 17 March 1848. He was trained for the army in the Imperial Military College and the Academy of the General Staff; was sent abroad to study military conditions in various European countries; in 1874 became a member of the general staff of the army; in 1876-7 assisted Skobeleff in the conquest of Khokand, Turkestan, and its reorganization as the territory of Ferghana; and in 1877-8 won high distinction in the Russo-Turkish war by his services at Plevna and the Chipka Pass. In 1878 he was made colonel and in 1878-9 was chief of the Asiatic bureau of the general staff. In 1880-1 he was in Middle Asia, where he commanded the main detachment against the Tekke-Turkomans, and, after a forced march of 600 miles across the desert, stormed Geok-Tepa, by which victory he won his greatest reputation. He was made major-general in 1882, lieutenant-general in 1890, governor of the Trans-Kaspian district and commander of the troops in that district in 1890, and minister of war in 1898. In 1901 he became general of infantry. At the outbreak of the hostilities with Japan, he was sent to command the Russian forces in the Far East. As a military writer he is favorably known by several volumes, including 'Kashgaric' (1879), for which he received the gold medal of the Imperial Russian Geographical Society; 'The Operations of the Troops of General Skobeleff during the War of Russia with the Turks' (1885); etc.

Kowloon, or Kaulun, a district in China, forming a peninsula at the mouth of the Canton River.

Koyunjik, koo-yoon-jēk', or **Kuyunjik**. See NINEVEH.

Kraft, kräft, Adam, German sculptor: b. Nuremberg 1440; d. Schwabach, Bavaria, 1507. Nothing is known of his teachers, his student travels or his fortunes. His known productions begin with the seven reliefs (Stations of the Cross) set up in Nuremberg 1490 near the entrance of Saint John's Church; these are now in the German Museum, their original place being taken by sandstone copies. He executed many sepulchral monuments, and in the Church of Saint Sebaldus is the statue he made for Sebald Schreyer, 1492. In the choir of the same church is his bas-relief of three scenes from the Passion, the figures being life-size. He also carved the monument for the Pergerstorff family in the Frauenkirche (Church of St. Mary, the Virgin); that for the Landauer family in a chapel of the Church of St. Egidius. His last work was the Entombment, a group of 15 life-size figures in the mortuary chapel of the Holzschuhschen family, a part of the Church of St. John (1507). He also executed several works of minor importance, as decorations of private and public buildings. His masterpiece is the tabernacle in the Church of Saint Lawrence which he took seven years (1493-1500) in completing. It is more than 50 feet high, and is an example of gorgeous Gothic carving enriched with numerous figures. At the foot he has placed his own portrait, life-size. His style is bold and vigorous, his conceptions are profoundly religious, and his power of life-like characterization is wonderful. He is the finest exponent of the Nuremberg school of Gothic sculpture.



ALEXEI NICOLAEVITCH KOUROPATKIN.

KRAIT—KREOSOTE

Krait, one of the most dreaded of Oriental poisonous snakes (*Bungarus caeruleus*), nearly related to the cobras. It inhabits nearly all India and Ceylon, is very common in Bengal and southern India, and causes more deaths than any other snake, since in its pursuit of rats, lizards and snakes, it frequently enters camps and village houses; furthermore, its venom is astonishingly rapid in its effects. It reaches a length of four feet, has smooth scales, a ridge along the spine, no hood, and is bluish or brownish black with highly variable bars and markings of yellow and white. Other deadly species of the same genus of bungars or rock-snakes are the larger *raj-samp* or "king-snake" (*B. fasciatus*), noted for its active killing of cobras and other snakes; and other species in Ceylon and the Indo-Chinese region. Consult the works of Fayerer and of Ewart on the poisonous snakes of India, and the 'Proceedings' of the Zoological Society of London for 1899.

Krakatoa, a volcanic island in Sunda Strait, between Sumatra and Java; area, 6 square miles, formerly about 12 square miles. The island, now uninhabited, is known as having been the scene of a terrific volcanic eruption on the night of 26–27 Aug. 1883. The volcano had been practically inactive for over 200 years until May of 1883, when there were indications of an eruption, which culminated at the date mentioned. A number of explosions occurred, the noise of which was heard for many miles. A mass of rock, in the form of dust, ashes, and small stones, and of the volume of about a cubic mile, was thrown up for a considerable distance. The dust was projected, vertically, nearly 20 miles, and distributed to all parts of the globe by the upper air currents. The effect, especially as shown in brilliant sunrises and sunsets, was visible for many months. The disturbance created a series of extensive sea-waves which swept over the shores of Java and Sumatra, destroying many villages and causing the loss of more than 30,000 people. The wave-motion was observed in South America. About one-half of the island was destroyed, including the highest mountain. One immediate effect was the darkness which alarmed many people, and which made 27 Aug. 1883 known as one of the dark days.

Kraken, krä'- or krä'kēn, the term, of Norwegian origin, applied to a fabulous sea-monster, generally assumed to be a gigantic squid (q.v.). It was first described by Pontoppidan, bishop of Bergen in Norway, but other old writers have accounts of substantially the same kind of monster. It is described as of enormous size; rising from the sea like an island about 1½ miles in circumference, with enormous mast-like arms with which it wrecked ships, created whirlpools, and realized all that was prodigious and strange in size, habits, and appearance. The kraken stories led to a similar creation by Victor Hugo in his 'Toilers of the Sea,' which, considered zoologically, is almost as far from possible truth as was that of old Pontoppidan.

Kra'nach, Lucas. See CRANACH.

Krausé, Lyda **Farrington**, "BARBARA YECHTON," American novelist and writer for young people: b. Saint Croix, W. I., 1864. She was for many years on the staff of 'The Church-

man' in New York, and among her published books are: 'Christine's Inspiration' (1892); 'Toinette' (1897); 'A Young Savage' (1899); 'Fortune's Boats' (1900).

Krausse, krows, **Alexis Sidney**, English author and publicist: b. Islington, London, 1859. He was educated at University College, London, has since devoted much time to foreign, especially Asiatic history and policy, and has been an industrious contributor to newspapers and magazines. Among the books he has published are: 'Starving London' (1886); 'China in Decay' (1900); 'Russia in Asia' (1899); 'The Story of the China Crisis'; 'The Far East, its History and its Question' (1900).

Krefeld, krä'fēld, or **Crefeld**, Prussia, a town in the government of Düsseldorf, 12 miles northwest of the town of Düsseldorf, and about four miles west of the Rhine. It consists of straight spacious streets and well-built houses; is the seat of several courts and public offices; contains churches for Roman Catholics, Old Catholics, Protestants, Mennonites, and Jews; a royal textile college, gymnasium, a monument of Moltke erected in 1897, hospitals, etc.; and is the principal locality in Prussia for the manufacture of silk and mixed silk goods, which was introduced by refugees from Juliers and Berg in the 17th and 18th centuries. The number of factories producing silk goods is about 120, exclusive of nearly 50 silk-dyeing works. The town also contains railroad shops, boiler-works, machine-shops, iron-foundries, chemical works, distilleries, sugar-refineries, soap-works, tanneries, paper-mills, etc. Krefeld came into the possession of Prussia in 1702, and except during the Napoleonic ascendancy it has remained with her ever since. Pop. (1890), 105,376; (1900), 106,928.

Krehbiel, krä'bēl, **Henry Edward**, American musical critic: b. Ann Arbor, Mich., 10 March 1854. He was musical critic successively on the Cincinnati *Gazette* and the New York *Tribune*. His published works include: 'The Technics of Violin Playing' (1880); 'How to Listen to Music' (1896); 'Studies in the Wagnerian Drama' (1891); 'The Philharmonic Society of New York: a Memorial' (1892); 'Music and Manners in the Classical Period' (1898); 'Music of the Modern World' (1897). He also edited an 'Annotated Bibliography of Fine Art' (1897).

Krem'lin, a Russian citadel, especially the citadel of Moscow (q.v.). It lies in the centre of the city, and contains the royal edifices and churches, particularly the residence of the emperor.

Kremnitz, krém'nīts, or **Cremonitz**, Hungary, a free mining town (called in Hungarian Körmöcbánya), in the county of Bars, in a deep valley surrounded by lofty hills, 15 miles northeast of Schemnitz. It consists of the town proper, surrounded by walls, and containing a castle, and of several large suburbs, in which are almost all the public buildings. There are some old churches, a Franciscan monastery of the 17th century, a mint, hospitals, etc. The manufactures consist of paper, delft-ware, vitriol, and cinnabar; but the prosperity of the town depends chiefly on the gold and silver mines in the vicinity. Pop. about 10,000.

Kre'osote. See CREOSOTE.

KRIEGSPIEL — KRUGER

Kriegspiel, krēg'spēl ("war-game"), a game of German origin, played with maps on a large scale, and colored metal blocks, on the same scale as the map, representing bodies of troops of various strength (brigades of infantry, battalions of rifles, regiments of cavalry, besides artillery, engineers, etc.). The players are usually two on each side, and the game forms an exact miniature of tactical operations. It is played by alternate moves; each move represents the lapse of two minutes, and rules are given to determine the distance that each branch of the service may move over in that time. When two bodies of men on opposite sides come into contact, the weaker in numbers and position is held to be defeated; but when they are equal in these respects victory is determined to one side or the other by the use of a die.

Krieker, krē'kér, a gunner's name for jack-snipe (q.v.).

Kris. See **CREESE**.

Krishna, krish'na, in Hindu mythology, the eighth avatar of Vishnu and the most popular deity in the Hindu pantheon. See **AVATAR**; **VISHNU**.

Kriss Kringle, a sort of St. Nicholas. On Christmas eve, Kriss Kringle, arrayed in a fur cap and strange apparel, goes to the bedroom of all good children, where he finds a stocking or sock hung up in expectation of his visit, in which depository he leaves a present for the young wearer. The word means Christ-child, and the eve is called Kriss-Kringle eve. See **St. NICHOLAS**.

Kronstadt, krōn'stāt, or **Cronstadt**, Russia, a maritime fortress in the government of St. Petersburg, and about 25 miles west of that city. It stands in the narrowest part of the Gulf of Finland, opposite to the mouth of the Neva, on a height of the long, narrow, rocky island of Kotlin, forming, both by its position and the strength of its fortifications, the bulwark of the capital, and the most important naval station of the empire. It was founded by Peter the Great in 1710, and has spacious, regular streets, with many handsome houses; Greek, Lutheran, English, and Roman Catholic churches; very large marine establishments, a navigation school, a naval arsenal, a cannon-founding, a barracks, building-yards, docks, etc. The harbor consists of three separate basins—a merchant haven, capable of containing 1,000 ships; a central haven for the repair of ships of war; and the war haven, which, in addition to the other works of the place, is defended by the strong fort of Kronsbot, built on two small adjoining islands. The chief disadvantage of Kronstadt as a port is the long period during which the harbor is blocked up by ice. The construction of a canal affording better access by sea to the capital has diminished the trade of Kronstadt, which in consequence will cease to be a commercial port. Pop. (1897) 59,539.

Kropotkin, Peter Alexeievitch, pā'tér ā-lék-si-ā-vich krō-pōt'kīn, Russian geographer and revolutionist: b. Moscow 9 Dec. 1842. He was educated in the Corps of Pages at St. Petersburg, and joining a regiment of Cossacks of the Amur went to Eastern Siberia as aide-de-camp to the military governor of Transbaikalia, becoming later attaché for Cossacks' affairs to the governor-general of Eastern

Siberia. He was connected with a prison commission and strove to get some reforms introduced into Siberian convict prisons, but his efforts proved of no avail. From 1863 he devoted his energies to a scientific investigation of Manchuria and the neighboring parts of Siberia, and his work in this department gained him the gold medal of the Russian Geographical Society in 1864. In 1871 he was sent by the Geographical Society to Finland to study glacial phenomena. Arrested in 1874 for promulgating radical ideas of social reform, he was confined in the prison of the military hospital, from which he contrived to escape to England in 1876. In the following year he went to Switzerland, where he founded at Geneva an anarchist journal called '*Le Révolté*', but in 1881 was expelled by the Swiss authorities on the demand of Russia. Returning to England in 1882, he wrote and lectured against the government of Alexander III. Having gone to France, he was arrested by the authorities and condemned (Jan. 1883) to five years' imprisonment for participation in the International, but he was released in January 1886, in consequence of a strong appeal made by leading French and English savants. Since then he has lived chiefly in London, engaged in literary work. He has written much on scientific subjects and has contributed to various encyclopedias. His separate publications include: '*Paroles d'un Révolté*' (1885); '*In Russian and French Prisons*' (1887); '*La Conquête du Pain*' (1888); '*L'Anarchie, sa Philosophie, son Idéal*' (1896; Eng. trans. 1897); '*The State: its Part in History*' (1898); '*Fields, Factories, and Workshops*' (1899); '*Memoirs of a Revolutionary*', first issued serially in '*The Atlantic Monthly*' (1899). Prince Kropotkin is one of the ablest representatives and most eloquent exponents of that theory of society known as anarchist-communism. He is opposed to all societies based on force or restraint, and looks forward to the advent of a purely voluntary society on a communistic basis. He desires to see the division of labor, which is the dominant factor in modern industry, replaced by what he calls the "integration of labor," and is a stanch believer in the immense possibilities of intensive agriculture. In 1901 he delivered a course of lectures at the Lowell Institute in Boston.

Krout, Mary H., American journalist: b. Crawfordsville, Ind., 3 Nov. 1857. She was for 10 years on the staff of the *Chicago Inter-Ocean*, has traveled extensively as a staff correspondent and is the author of '*Hawaii and a Revolution*'; '*A Looker-on in London*' (1899); '*Alice in the Hawaiian Islands*' (1899); etc.

Kruger, kroo'gér, Stephanus Johannes Paulus, Boer statesman: b. Colesberg, Cape Colony, 10 Oct. 1825; d. Clarens, Switzerland, 14 July 1904. At 11 he accompanied his parents in the "great trek" or migration of Boers, whom the British administrators had antagonized, from the Cape Colony,—a movement which resulted in the colonization by Boers of Natal, the Orange Free State, and the Transvaal. He and his parents resided for a time in the Orange Free State, but they ultimately made their home north of the river Vaal. At 16 he was assistant to a field cornet, and not long afterward became a field cornet himself. From that time he was constantly connected with either the military or the civil government of the

From "Memoirs of a Revolutionary."

PRINCE KROPOTKIN,
The Russian Revolutionist.

By courtesy of Munroe, Houghton, Mifflin & Co

KRUMMACHER—KRUTTSCHNITT

Transvaal, and his force of character gradually brought him to the front. In 1863 he became commandant-general, and in that capacity put down civil feuds and defeated the Basutos. At the time of the annexation of the Transvaal to the British territories in 1877 he was vice-president under President Burgers. Upon the reorganization of the Boer government by the national committee in 1880, he again assumed the office of vice-president, and in the war of 1880-1 with Great Britain, he took a leading part. He was elected president in 1883, and re-elected in 1888, 1893, and 1898. He visited England in 1883 in order to obtain a revision of the Pretoria Convention of 1881, and before his return in the following year he secured its replacement by a new convention practically granting independence—except in so far as relations with foreign countries were concerned—and authorizing the renaming of the State as the South African Republic. Kruger's position in the republic was now one of almost unlimited influence and authority. The enormous influx of foreigners after the discovery of the rich gold deposits of the Witwatersrand created problems of the utmost gravity. The greed of the British South African Company was extreme, the Uitlanders complained of injustice, and the Boers on their part were determined to resist foreign aggression. A crisis presented itself in the so-called 'Jameson Raid' (q.v.) of December 1895, which was easily crushed by the Boers, and at the same time led them to look forward to another and greater struggle with the English and to accumulate a large supply of military stores. Kruger managed with much diplomatic skill the difficult matters connected with this affair. In the second war with Great Britain Kruger remained in the country till the fall of Pretoria (5 June 1900), then escaped into Portuguese territory, and thence 19 Oct. sailed for Europe, hoping to enlist some of the European powers on behalf of the Boer republics, but failing in this he took up his residence in the Netherlands. In the summer of 1901 he proposed visiting the United States for the purpose of inducing the government to give its moral support to the Boers, but on being informed that neither President McKinley nor after him President Roosevelt would receive him in other than a strictly unofficial manner, the project was abandoned. His wife died at Pretoria in July 1901. See also SOUTH AFRICAN WAR. Consult: Van Dordt, 'Paul Kruger' (1900); Statham, 'Paul Kruger and his Times' (1898).

Krummacher, Friedrich Adolf, frēd'rīkh ä'dölf kroom'mäh-ér, German theologian: b. Tecklenburg 13 July 1767; d. Bremen 4 April 1845. A minister in the German Reformed Church and a professor of theology, he became widely known by his 'Parables' (1805), which ran through many editions and are familiar in an English translation. They were as a rule short, written in simple prose, on such subjects as 'The Blind Man,' 'Life and Death,' 'The Hero,' etc. None of his other writings won popularity.

Krupp, kroop, Alfred, German inventor and metallurgist: b. Essen, Prussia, 26 April 1812; d. there 14 July 1887. He was a son of Friedrich Krupp (q.v.). In 1848 he assumed charge of the Krupp Steel Works at Essen and presently discovered the method of casting steel

in very large masses. In 1851 he sent to the London Exhibition a block of steel weighing 4,500 pounds, and was able to cast steel in one mass weighing more than 100,000 pounds. Although he manufactured a great variety of articles for use in various peaceful industries, his world-wide fame arose from his production of the enormous siege guns used by the Germans when they invested Paris. Several of Krupp's processes in the manufacture of steel and in the making of cannon were very carefully kept from the knowledge of the outside world and only employees were admitted to his foundries.

Krupp, Friedrich, frēd'rīkh, German manufacturer: b. 1787; d. 1826. He established a small forge at Essen, Rhenish Prussia, in 1870, experimented in the making of cast-steel, the secret of which was then carefully kept in Great Britain, and was able in 1812 to manufacture some of the material. In 1818, on the site of the present large Krupp establishment, he built a small plant of eight melting furnaces, each with one crucible. He turned out a steel of excellent quality, though not perfectly successful; but demand for the product was then slight, despite its use for mint-dies and some other purposes, and the activity of the manufactory was correspondingly small.

Krupp, Friedrich Alfred, German gun-maker: b. Essen, Germany, 17 Feb. 1854; d. there 22 Nov. 1902. He was known as the "Cannon King" in Germany and was the son of Alfred Krupp, who invented a new Bessemer steel, out of which he made rifles and cannons, a seamless tire for car-wheels; and discovered a new method of hardening armor plate. His grandfather, Friedrich Krupp (q.v.), founded the steel industry of Essen, beginning in 1817 with two laborers. The present Krupp works cover 150 acres, and the daily output is about 1,877 tons. The Krups have been head of the iron and steel industry of Prussia for many years; their establishment is one of the greatest in the world. Friedrich Alfred Krupp was the richest man in the empire. He was generous to his operatives, built for them 5,469 dwellings, each with its garden, besides providing convalescent hospitals and orphanages. He also maintained a pension fund of \$4,125,000 for their benefit. He vastly improved the capacity of the business by taking in other steel works at Rheinhausen and in the neighborhood of Magdeburg; acquiring coal mines in Germany, and iron mines in Spain, as well as in Germany. The shipyards and engine shops of Kiel and Berlin which he amalgamated with the mining and founding business, were sources of great wealth, and he owned a fleet of steamers for the exportation of his goods. Thus although he took no active part in his business on its technical side (in which he differed from his father and grandfather) his skill in finance was so great that in 15 years he almost doubled his inherited fortune. Compare: ARMOR-PLATE; IRON AND STEEL INDUSTRY; and ORDNANCE.

Krupp's Steel. See STEEL.

Krutt'schnitt, Ernest Benjamin, American publicist and lawyer: b. New Orleans 17 April 1852; son of John and Peninah (Benjamin) K. He studied three years at Washington College (1867-70), and then entered its law school, being admitted to the bar in 1874. He has oc-

KRYPTON—KU-KLUX

cupied many positions of prominence in New Orleans, and was particularly interested in its public schools, being since 1890 president of the board of directors. In 1898 he received the degree of LL.D. from Washington and Lee University. He was chairman of the Democratic State Executive Committee (1892-6) and later chairman of the Democratic State Central Committee. In 1898 he was elected president of the Louisiana Constitutional Convention.

Kryp'ton, a gaseous element discovered in the atmosphere by Ramsay and Travers, in 1898. (The history of this member of the argon group is so bound up with that of argon itself, that reference should be made to the article ARGON, and to the references there given.) Krypton was discovered in the last fraction remaining after the evaporation of a considerable quantity of liquid air. The residue consisted chiefly of argon, oxygen and nitrogen; but when the oxygen and nitrogen had been removed, a spectroscopic examination of what remained showed lines that indicated the existence of at least one new element, in addition to argon and helium. To this new element the name "krypton" was assigned, from a Greek word signifying "hidden," in allusion to the circumstances under which the discovery was made. (See also NEON and XENON.) Little is known, as yet, concerning the properties of krypton. When it was isolated by means of a tedious diffusion process, it was found by Ramsay and Travers to have a density about 40.75 times as great as that of hydrogen, and an atomic weight of about 81.5. The ratio of its specific heat at constant pressure to its specific heat at constant volume was found to be 1.66, as in the cases of argon and helium. Subsequent experiments by Ladenburg and Krugel have indicated a density of about 29.5, and therefore an atomic weight of about 59. Travers, in his book issued subsequently to these later experiments, makes no reference to them. Considerations based upon the periodic law (q.v.) appear to indicate that the results of Ramsay and Travers are the more probable; but this point is as yet undecided. Krypton exists in the air in the proportion of about one part in a million. It has the chemical symbol Kr, and appears to be as inert, chemically, as argon.

Ktistola'tra. See MONOPHYSITES.

Ku-klux (kü'klüks) Klan, a secret organization founded at Pulaski, Tenn., in 1866. Formed originally for purposes of amusement only, it soon developed into an association of "regulators," and became notorious for the lawless deeds of violence performed in its name. The proceedings of the Ku-Klux in the Southern States were a feature of the determined struggle to withhold from the emancipated slaves the right of voting. The outrages and murders which convulsed the country in 1868-9 ended in the calling out of troops and the formal disbandment of the society in March of the latter year; but its name and often its disguises were used for years to cover the violence of political desperadoes. At the first meeting in 1866 a name was suggested — "Ku-Klo," from the Greek "Kuklos," a band or circle. On the mention of this name some one cried out, "Call it 'Kuklux.'" Nearly all present were Tennesseans, with only one or two from farther south. On the name being pronounced, a Geor-

gia man present remarked: "Kuklux, that sounds like 'Coletz,' our old society, called the 'Lost Clan of Coletz.'" The Coletz Indians were a clan, not a tribe, that had existed some 200 years previously. The name was adopted and the society provided for the following officers: A Grand Cyclops or President; a Grand Magus or Vice-President; a Grand Turk or Marshal; a Grand Exchequer or Treasurer, and two Lictors. There were the outer and inner guards of the "Den," as the place of meeting was designated. Each member was required to provide himself with the following outfit: A white mask for the face, with orifices for the eyes and nose; a tall, fantastic cardboard hat, so constructed as to increase the wearer's apparent height, and in shape like those placed on the heads of the heretics formerly burnt in the Portuguese and Spanish *auto-de-fés*; a gown or robe of sufficient length to cover the entire person. The color and material were left to the wearer's fancy, and each selected what would in his judgment be most hideous and fantastic. Each member carried also a small whistle, with which, by means of a code of signals agreed on, they held communication with one another. The Klan increased in numbers and in power, an *imperium in imperio*, until its decrees were far more potent and its powers more dreaded than that of the visible commonwealths which it either dominated or terrorized. In April 1867 the Grand Cyclops of the Pulaski den sent out a request to all the dens scattered over the South to appoint delegates to meet in convention at Nashville, Tenn., in the early summer of 1867. At the time appointed this convention was held. Delegates were present from the Carolinas, Alabama, Georgia, Louisiana and other Southern States. A plan of reorganization previously prepared was submitted to the Convention and adopted, and the delegates returned to their various States as secretly as they had come.

The grand officers were: The Grand Wizard of the Invisible Empire and his ten Genii. The powers of this officer were almost autocratic. The Grand Dragon of the Realm and his eight Hydras; the Grand Titian of the Dominion and his six Furies; the Grand Cyclops of the Den and his two Nighthawks; a Grand Monk; a Grand Exchequer; a grand Lictor; a Grand Scribe; a Grand Turk; a Grand Sentinel. The Genii, Hydras, Furies, Goblins and Nighthawks were staff officers. The gradation and distribution of authority were perfect.

One of the most important things done by this Nashville convention was to make a positive and emphatic declaration of the principles of the order. It was in the following terms:

"We recognize our relations to the United States Government; the supremacy of the Constitution; the constitutional laws thereof; and the union of the States thereunder."

This Nashville convention also defined and set forth the peculiar objects of the order as follows:

1. To protect the weak, the innocent, and the defenseless from the indignities, wrongs, and outrages of the lawless, the violent and the brutal; to relieve the injured and the oppressed; to succor the suffering, and especially the widows and orphans of Confederate soldiers.

2. To protect and defend the Constitution of the United States and all laws passed in con-

KUBELIK — KUMISS

formity thereto, and to protect the States and people from all invasion from any source whatever.

3. To aid and assist in the execution of all constitutional laws, and to protect the people from unlawful seizure, and from trial except by their peers in conformity to the laws of the land.

The Klan had a very large membership; it exerted a vast, terrifying and wholesome power, but its influence was never at any time dependent on or proportioned to its membership. A careful estimate placed the number of Kuklux in Tennessee at 40,000, and in the entire South at 550,000. The organization was disbanded in March 1869.

Kubelik, Jan, yän koo'bë-lék, Bohemian violinist: b. Miehle, near Prague, 1880. He studied at the Prague Conservatory and subsequently performed at semi-private musicales. In 1898 he appeared at a public orchestral concert and in 1900 with the Berlin Philharmonic Society, and made his début in London in June of that year. Subsequently he made a brief but successful tour on the Continent and in England, and in December, 1901, came to the United States, where he was most enthusiastically received.

Kùblai Khan, koob'lì khän (more properly KHÜBLAI KHAN), called by the Chinese Chi-Tson, Mongol emperor: b. 1214; d. 1294. He was the founder of the twentieth Chinese dynasty, that of the Mongols or Yuen. He was a grandson of Genghis Khan, and in 1259 succeeded his brother Mangú as Khagan or Grand Khan of the Mongols, and in 1260 he conquered the whole of northern China, driving out the Tartar or Kin dynasty. He then ruled over the conquered territory himself, and 19 years later added to it southern China, the dominion of the Song dynasty, which had originally summoned his assistance in driving out the Tartars from the north. Kùblai thus became sole ruler of an empire extending over a large part of Asia, as well as over those parts of Europe that had belonged to the dominion of Genghis Khan. He repaired the evils of so many wars by a wise administration, and by the encouragement which he gave to letters, commerce, industry, and agriculture, brought them all to a very flourishing condition. Marco Polo, the celebrated Venetian traveler, who lived 17 years at the court of this prince, gives some interesting information regarding him. Kùblai Khan is the subject of a poetical fragment by Coleridge.

Kuch Behar. See COOCH BEHAR.

Kuen-lun, kwén-loon', a great mountain system of central Asia, between the Himalayas on the south and the Thian-Shan on the north. It extends from the Pamir plateau in about lon. 75° E. eastward into China, terminating in about lon. 120° E. It varies in breadth, both extremities being compressed, its middle portion consisting of numerous more or less parallel chains. Nearly the whole group is between lat. 30° and 40° N. The most northern part on the west is a continuous mountain-wall having several names and being farther continued by the Nan-shan and other chains well into China. Toward the south are three roughly parallel shorter ranges, the last of which, with its eastern continuations, forms the southern boundary of a mountainous region in which are the Tsai-

dam salt waste and the Koko-Nor lakes. Between the last named group and one farther south the Hoang-ho rises. The most southerly chain of the central Kuen-lun is that of the Yang-la Mountains. The greatest elevation of the Kuen-lun is in the western ranges, and reaches over 22,500 feet, while the chief western ranges average about 20,000 feet. Most of the peaks of the eastern chains, in China proper, are under 17,000 feet.

Kugler, Franz Theodor, fränts tā'ō-dör koog'lér, German writer on art: b. Stettin 19 Jan. 1808; d. Berlin 18 March 1858. He was appointed a professor of fine arts in the University of Berlin in 1833, and subsequently became a member of the Academy of Berlin. His works have undoubtedly exercised great influence on German art and culture; notably a 'History of Painting from Constantine the Great to the Present Times' (1837); 'Hand-book of the History of Art' (1841-2); 'History of Architecture' (1856). He also wrote a 'History of Frederick the Great' (1840), which is popular in Germany. His 'History of Art' was continued by W. Lübke (q.v.).

Kuhns, kooms, Oscar, American educator and author: b. Columbia, Pa., 21 Feb. 1856. He was graduated from Wesleyan University in 1885 and has been professor of modern languages there from 1890. He has written 'The German and Swiss Settlements of Colonial Pennsylvania' (1900); 'The Treatment of Nature in Dante's Divina Commedia' (1897); etc.

Kulturkampf, kool'toor-kämpf, a German term denoting the contest for political and legal rights waged between the authorities of Germany on the one hand and the authorities of the Roman Catholic Church on the other. The conflict was initiated by Bismarck in 1872 and had for its main point of dispute the control by the State of educational and ecclesiastical appointments. He urged that the declaration of Papal infallibility by the Vatican council in 1870 was an arrogation of rights dangerous to the state and that the Roman Catholic Church had assumed an attitude of aggression dangerous to the laws of the state. The ill feeling arising from the questions at issue led the Reichstag to pass a law in 1872 expelling the Jesuits from the German empire. The outbreak of the Kulturkampf, however, dated from the enactment of the May Laws (1873) aiming at state control of the clergy. The Roman Catholic bishops, clergy, and people refused to recognize the validity of the new laws. This opposition was met by still more drastic government measures and in 1875 all recusant priests were deprived of their salaries and all religious orders were abolished. The accession of Pope Leo XIII. prepared the way, however, for a resumption of friendly relations between the Imperial government and the Roman Catholic Church, and negotiations began in 1878 resulting in a nullification of the laws of 1873.

Kumas'si. See COOMASSIE.

Kumiss, koo'mis, a preparation of milk, whether cow's, mare's, ass's, or goat's, which is said to possess wonderful nutritive and assimilable properties, so that it is very valuable in the treatment of consumption, scrofula, chronic diarrhoea, and debility and emaciation in general. It consists essentially of milk in process

KUMQUAT — KURDISTAN

of fermentation, and cow's milk is what is used for making it in Great Britain. On the Asiatic steppes, where it has been long used as a beverage, it is made of mare's milk, but kumiss of mare's milk or goat's milk has a somewhat unpleasant smell. The manufacture of kumiss is carried on in Switzerland, Russia, and elsewhere. An analysis of a Swiss variety showed that it was composed of fully 90 per cent of water, nearly 3/4 of alcohol, rather more than 2 of sugar, about 1/4 each of butter and albuminates, besides lactic acid, free carbonic acid, and inorganic salts.

Kumquat, küm'kwöt, a tree about six feet high, one of the *Citrus* group, closely related to the orange and growing in China and Japan. There are groves of it in the island of Chusan. The fruit, which is oval, is about the size of a gooseberry, and has a sweet rind and an acid taste. The Chinese make preserves of it, which are largely sold in American cities.

Kuntze, koont'sé, Edward J., German-American sculptor: b. Pomerania 1824; d. United States 1870. After studying in the Academy of Fine Arts, Stockholm, Sweden, he took up his residence in London, but eventually (1844) went to New York, where he was elected Associate of the National Academy (1869). His reputation was made in the United States by his statuettes, among which that of Lincoln was extremely popular. He also executed figures of Shakespeare and Goethe on the same scale; while his statue of 'Psyche,' his bust of 'Mirth,' and his medallion portraits are all in their way excellent.

Kunz, koonz, George Frederick, American gem expert: b. New York 29 Sept. 1856. He was educated at Cooper Union, and became a special agent of the United States Geological Survey in 1883. He was placed in charge of the department of mines at the Omaha, Atlanta, World's Columbian and Paris Expositions. He has been president of the New York Mineralogical Club and vice-president of the American Institute of Mining Engineers, and is a member of many societies at home and abroad. Beside contributing innumerable papers on gems, minerals, etc., to magazines and reviews, he has published 'Gems and Precious Stones of North America'; and annual reports on the 'Production of Precious Stones,' in 'Mineral Resources of the United States,' etc.

Kunz'ite, the name of a recently discovered precious stone found in southern California; so called in honor of Dr. George F. Kunz, the special agent in charge of precious stones, United States Geological Survey, since 1882. It is a brilliant gem and is between the topaz and pink sapphire in color. A rose-lilac is the tint which marks this stone, a color new among gems; and its radiance is peculiar and beautiful.

Kunzite was brought to light in 1902 near Pala, in San Diego County, Cal., and was sent for classification to Dr. Kunz, the eminent mineralogist of New York. Much attention was attracted by the beautiful lilac-colored crystals, for nowhere in the country, not even in the American Museum of Natural History at New York, which has the finest collection of spodumene, under which the new gem was classed, had there been seen such remarkable and perfect specimens as these. Dr. Kunz identified the

gem and described it; but Dr. Charles Baskerville, professor of chemistry in the University of North Carolina, finally subjected it to ultraviolet light, then to the rays of high penetrative power, and lastly to the bombardment of the corpuscles shooting out from radium, which resulted in some wonderful effects new to the scientific world. Of these effects Dr. Charles Baskerville, who took the liberty of naming the gem "Kunzite," for his friend, gives the following account:

"On examining this gem we directed our attention to discovering the effect of radium on precious stones. It was shown early in the experiments of the French mineralogist, Curie, that many diamonds phosphoresce, that is, glow in the dark, after being exposed to the emanations of radium. All diamonds phosphoresce with radium, as we learned by applying the test to about two thousand gems collected from some fifteen thousand. The gem in which we were particularly interested belongs to the class of spodumene. Mineral spodumene is usually obtained in large opaque whitish crystals, but from time to time small specimens, often richly colored and transparent, are found. The three characteristic varieties of the latter are a clear yellow gem spodumene of Brazil, the green hidrite, or lithia emerald of North Carolina, and the lilac sometimes found in Connecticut. These are without doubt remnants of large specimens, which must have been elegant. Spodumene is very subject to alteration and has usually lost all its transparency and beauty of tint."

The California spodumene crystals are of a rose-lilac tint, varying with the spodumene dichroism, from a very pale tinge when observed transversely to the prism, to a rich amethystine hue longitudinally. No such crystals of spodumene have ever been seen before, and the discovery is of great mineralogical interest. The crystals have been etched by weathering and have a twinning like the hidrite variety. When cut and mounted parallel to the base, they yield gems of great beauty. Baskerville, Kunz and Crookes have found this almost as luminescently responsive to the action of radium as the diamond.

Kurdistan, koor-dis-tän' (Persian, "land of the Kurds"), an extensive territory of western Asia, comprehending the greater part of the mountainous region which borders on the western side of the great plateau of Iran or Persia, and stretches westward till it overhangs the low plains of Mesopotamia on the southwest, and reaches the borders of the Turkish provinces of Diarbekir and Erzerum on the northwest. Its limits, as nearly as they can be defined, lie between lat. 34° and 39° N.; and lon. 42° and 47° E., with an area of nearly 40,000 square miles. The surface is very mountainous, and is traversed by lofty ranges stretching northwest to southeast. The whole surface on the west of the Persian frontier is drained by the Tigris and the Euphrates and their tributaries. Unless Lake Van is considered as partly within the territory, there are no lakes of any consequence. The mountains are covered with forests of oak and other hard timber. Many of the valleys are under regular culture, with corn-fields, orchards, and vineyards. One of the most remarkable vegetables is manna, expressively called in Turkish *Kudret-hal-vassis*, or the Divine sweet-

KURIA MURIA ISLANDS—KYANITE

meat, which is used as food. Fine horses and oxen are bred, and sheep and goats are kept in large numbers.

The Kurds are a stout, dark race, well formed, with dark hair, small eyes, wide mouth, and a fierce look. Most of the men are armed, using lances, sabres, daggers, muskets, and pistols. Many of the tribes are still nomadic. The language is of the same stock as the modern Persian. The great body of the Kurds are Mohammedans. They care little for trade, although they send to Kirkuk, Hamadan, etc., gall-nuts, tobacco, honey, sheep-skins, and cattle; obtaining in return coffee, rice, leather, and clothing, chiefly cotton goods. Their allegiance to the Turkish sultan is but slight. The famous Sultan Saladin was a Kurd. It is very difficult to form even an approximate estimate of the whole Kurd population; the Turkish portion is supposed to contain about 2,500,000, and the Persian portion 400,000; but another estimate would give for these numbers 1,300,000 and 500,000 respectively.

Kuria Muria (koo'rē-ä moo'rē-ä) Islands, a group of islands situated off the southern coast of Arabia at distances varying from 10 to about 30 miles, with a total area of over 25 square miles. Guano deposits are found in these islands, but they are considered to be barren, and have very few inhabitants. In 1854 they were ceded to Great Britain.

Kuriles, koo'rīlz, a chain of islands in the North Pacific Ocean, belonging to Japan (q.v.). The chain extends southwest to northeast from lat. $43^{\circ} 40'$ to 51° N.; lon. 145° to 156° E. They are divided into the Great and the Little Kuriles.

Kuroshiwō, koo-rō-shē'wō (Japanese, "black current"), a current of the Pacific Ocean somewhat analogous to the Gulf Stream. It takes its origin in the great north equatorial current along the southeast of Asia, flows past the Philippine Islands and Formosa, which somewhat deflect it, past Japan, the Kuriles and the Aleutian Islands, and thence bends southward toward California. As it approaches the American coast the current increases in breadth. It is much inferior to the Gulf Stream both in volume and in high temperature. It was formerly thought that the Kuroshiwō had a moderating effect upon the Pacific coast climate of this continent, but this view has been abandoned by reason of the scientific knowledge that the prevailing winds of the North Pacific bring eastward the warmth and moisture which produce the climatic moderation observed upon its shores.

Kurtz, koorts, Charles M., art expert: b. Pennsylvania about 1855. He was graduated from Washington and Jefferson College in 1876, studied at the National Academy of Design (New York), was for some time on the staff of the New York *Tribune*, was nine years editor of 'National Academy Notes,' and edited the 'Art Union Magazine' in 1884. In 1891 he withdrew from journalism and was appointed assistant chief of the department of fine arts in the World's Columbian Exposition (Chicago 1893). In 1894-9 he was art director of the St. Louis annual exposition, in 1899 was appointed assistant director of fine arts for the United States at the Paris exposition of 1900,

and in 1901 assistant chief of the department of art at the Louisiana Purchase exposition.

Kusi, koo sē. See Coosy.

Kuskoquim, kūskō-kwim, Alaska, the second river in size in the Territory, rising on the northern slopes of Mount McKinley, and after a southwestern course of over 500 miles, flowing through the wide estuary of Kuskoquim Bay into Bering Sea, about 200 miles south of the Yukon Delta. The trading stations along its banks are Kolmakoof, Oknagamut, Odgavigamut, Gavimamutt and Bethel. The inhabitants in the region are chiefly Indians and Eskimos. Gold was discovered in the valley of the Kuskoquim in 1903.

Kutchin, kū-chin', a name given to the tribes of the Athabascan Indians who live near the Yukon River in Alaska, and in British North America. They are also called Loucheux and Quarrelers. They number less than 2,000.

Kutztown, koots'town, Pa., borough in Berks County, on the Philadelphia & R. railroad, 18 miles northeast of Reading. There is a normal school here and manufactures of flour, leather, shoes, hosiery, etc. Pop. (1900) 1,328.

Kuyp, Albert. See CUYP, ALBERT.

Kuyper, ki'pér, Abraham, Dutch theologian and politician: b. Maassluis, Netherlands, 1837. After a course of theology at Leyden he became a preacher, and in 1874 was elected member of the lower house of Parliament, or Second Chamber, where he formed the Anti-Revolutionary party. He soon afterward quitted parliamentary life and launched out into the career of a publicist and journalist, still leading his party with great éclat. In theology he is the leader of staunch Calvinistic orthodoxy, and is opposed to all "modernism." In 1880 he founded in Amsterdam the Free University. His political organ is the 'Standaard'; his religious organ the 'Heraut.' Among his works is 'Ons Program' (1880); he has also edited the works of the Polish reformer Jan Laski, and is well known in the United States from De Vries's English translation of his 'Encyclopedia of Sacred Theology' (1898).

Kwalhiokwa, kwäl-hē-ō'kwā, a tribe of Athabascan Indians, formerly living on Willo-pah River, Washington, near the Lower Chinook Indians. They are frequently confounded with the Owilapsh or Whilpah.

Kwanza, kwän'zä, or **Coanza**, kō-än'zä, a large river of Portuguese West Africa. Rising in Lake Mussombo, it flows at first in a north-easterly direction, then north, and finally in a westerly and northwesterly course, and enters the Atlantic Ocean near lat. $9^{\circ} 10'$ S., not far south of Saint Paul de Loanda. In the lower part of its course there are many falls, the last being the Livingstone or Kambambe Falls, below which for a distance of about 170 miles the river is navigable for small steamers. Its total length is about 800 miles.

Kyanite, ki'a-nit, or **Cyanite**, a native aluminum silicate, Al_2SiO_5 , identical in composition with sillimanite and andalusite but very different in its physical properties. Its hardness varies on different faces from 4. to 7. Its specific gravity is 3.56 to 3.67. It is triclinic, the crystals usually being long-bladed, transparent or translucent, and of a beautiful sky-blue color in

KYANIZING — KYRIE ELEISON

the centre. Stout crystals of a grass-green color occur in North Carolina. The finest specimens come from Faido, Switzerland, occurring in paragonite schist. Cyanite abounds throughout the New England and Middle Atlantic States.

Ky'anizing, a process for preserving timber, cordage, etc., from the effects of dry-rot, named from an inventor of the name of Kyan. It consists in immersing the material to be preserved in a solution of corrosive sublimate and water, in the proportion of 1 pound of the former to from 10 to 15 gallons of the latter, according to the strength required. The time during which timber must be allowed to remain in the solution depends upon its size and thickness. For boards and small timbers 24 hours are required for each inch of thickness. This process is now almost entirely disused, as wood

is much better preserved by being saturated with kreosote or coal-tar.

Kym'ry. See **CYMRI**.

Kyrie Eleison, *kir'i-ē ē-lā'i-sōn* (from the Greek *Kyrie eleison*, "Lord, have mercy"), an invocation following the introit of the mass. It is almost the only part of the liturgy in which the Roman Catholic Church has retained the use of Greek words. Just after the introit the priest celebrating the mass and the servers repeat alternately three times "Kyrie eleison," and then as many times in the same manner "Christe eleison," and so on alternately. When it is sung the leading singer takes the part of the priest, and the choir that of the servers. The introduction of the Kyrie into the mass is attributed to Pope Sylvester I., in the beginning of the 4th century.

L

L the twelfth letter of the English and most of the other modern European languages. Its definitive form in the Greek alphabet is **Λ**, but in very early Grecian, Hebrew and Phoenician monuments it has the form **ν** or **λ**. Its name in Hebrew and Phoenician is lamed and in Greek lambda.

The sound of **l** is produced when the tip of the tongue is brought into contact with the palate behind the upper front teeth, and, with the jaws apart, the breath is emitted. The sound of **r** is produced in nearly the same way, but in sounding the **r** the tongue is not in contact with the palate and may vibrate. Thus these two letters represent sounds that are much alike. But there are nations that cannot sound the **r**, as the Chinese and sundry other races; these substitute **l** for **r**: the technical name for this vice of utterance is lambdacism; the opposite vice is an inability to pronounce **l**, for which **r** is substituted, as by the Japanese. In languages whose syllabaries admit both these sounds the two letters are freely interchanged or confounded. In languages belonging to one common family, the Aryan, for example, a word which in one language has **r**, in another has **l**, and *vicc versa*; examples: Lat. *prunus*, Eng. *plum*; Lat. *ulmus* (elm), Fr. *orme*. The like is seen in the formation of derivatives within one language. Thus in Latin the adjective termination *alis* (Eng. *al*, as in *liberal*) is changed to *aris* when the word has already an **l**: for example: from *peculium* comes *peculiaris*, from *auxilium*, *auxiliaris*, and *vice versa*, **r** for a like reason is changed to **l**: thus from *per* and *lucidus* comes *pellucidus*, from *inter* and *lectus*, *intellectus*. **L** is also substituted in one language for **n** in another; for example: Gr. *pneumon* (lung), Lat. *pulmo*. Or **d** and **l** are interchanged: Gr. *Odysseus*, Lat. *Ulysses*; the like is seen in the two Latin words *odor* and *olor*; and the Latin *lingua* was once written *dingua*, allied to Eng. tongue and Ger. *zunge*.

In Italian the **l** of Latin words is often changed to **i**: Lat. *planus*, *plumbum* (lead), Ital. *piano*, *piombo*.

In English **l** is often silent: palm, calm. In French **al** becomes **au**; **à le** becomes **au**, **cheval** (horse) plu. **chevaux**; and the English auburn is from Latin *alburnus*. In English and most of the other languages **l**, whether single or double, has one sound-value only, the same which it has in pale, pallid; but in French sometimes **ll** has a sound resembling that of **lli** in *million*: in Spanish **ll** may commence a word, for example: *llana* (wool), and is classed as a distinct alphabetic character: its sound-value is the same as that of **ll** in French.

L. E. L., the *nom-de-plume* initials of an English novelist, Letitia Elizabeth Landon, later Mrs. Maclean.

La, in music, the syllable which denotes the sixth note of the diatonic scale.

Laager, lä'gér (Dutch, "a camp"), in South Africa, an encampment more or less fortified. The original Boer laager is an enclosure made of the wagons of a traveling party for defense against enemies.

Laaland, lä'länd, or *Loiland*, an island of Denmark, in the Baltic Sea. Its greatest length, southeast to northwest, is 36 miles; breadth, varying from 9 miles to 17 miles; area, 462 square miles. The surface, as implied by its name, meaning "low land," is so very little raised above the sea, that parts of it along the coast are subject to frequent inundations; and for a considerable distance around it the water is so shallow that there are few places in which vessels drawing 8 feet can approach it without danger. The soil, consisting generally of a heavy loam, is very fertile, and yields excellent crops of corn. Beans, hops, and hemp are extensively grown. Varieties of hardwood timber are abundant. Pop. 65,550.

Laar, or **Laer**, Peter van, Dutch painter: b. Haarlem, Netherlands, 1590; d. sometime after 1658. Early in life he went to France, and subsequently visited Italy (1623). Here he mainly resided at Rome, where he became associated with Claude Lorraine, Poussin and Sandrart. He was small and crooked in stature, and was thus called by the Italians "Bamboccio," and the comic scenes of rustic life painted in his style became known as "Bambocciad." He returned to Haarlem in 1639. He painted pastoral and banditti scenes, fairs, and such like rural incidents, with spirited and vigorous brush, although his coloring is somewhat hard. A masterpiece of his, 'The Market Crier,' is in the gallery at Cassel. Other pictures of his are to be found at Paris, Dresden, Vienna, Munich, etc. About 20 etchings from his hand are also extant, chiefly animals and landscape, which are spirited and finely executed.

Labadie, Jean de, French mystic and separatist: b. Bourg en Guienne 13 Feb. 1610; d. Altona, Prussia, 13 Feb. 1674. He was educated at Bordeaux by the Jesuits, and belonged to their order till 1639. He then quitted it, both because irregularities were detected in his conduct, and he was found to have adopted many very peculiar and extravagant views. For these he was cited before the Parliament, but fled to Geneva. At a later period he returned to France, and took up his residence in Amiens, whose bishop entrusted him with the visitation of the monasteries in his diocese. He also found a patron in

LA BARCA—LABIATAE

the archbishop of Toulouse. His zealous opposition to some of the clergy subjected him again to persecution, and to escape from it he, in 1650, went over to the Reformed Church, but not finding himself so comfortable as he expected, he thought he had received a call to found an apostolic church for himself. He now became a preacher in Montauban, and afterward, on being obliged to leave it, in the town of Orange, from which he proceeded successively to Geneva, Middleburg, and Amsterdam. In the last city he collected his followers into a distinct church or society under the name of Labadists. Toleration being now denied him, he in 1670 proceeded to Herford, where the Palsgrave Elizabeth gave him protection. Driven thence by an imperial edict in 1672, he went first to Bremen, and finally to Altona, where he held private meetings.

La Barca, lä bär'kä, Mexico, town in the State of Jalisco, east of Chapala, and 60 miles southeast of Guadalajara, on the International railroad between that city and the capital. The town was founded in 1529 by Nuño de Guzman, and during the Mexican war for independence the town was the scene of two serious battles. Pop. (1900) 10,000.

La Barre, Antoine Joseph Lefèvre de, French sailor: b. about the beginning of the 17th century; d. 4 May 1688. He rose to early prominence as an officer of the French navy, and was appointed governor of Guiana in 1663. He was successful in recapturing Cayenne which had been occupied by the Dutch. On being commissioned lieutenant-general he sailed for the West Indies, and, in a fight with the English in the Antilles, compelled them to raise the blockade of Saint Christopher. Succeeding Frontenac as governor of Canada in 1682, his irresolution in his negotiations with the Indians was so disastrous that he was recalled in 1684.

Lab'arum, the name given from the time of Constantine to the imperial banner. Eusebius has described it with much particularity. It was in the form of a long pike, crossed at a certain height by a beam, from which depended a banner richly embroidered with gold, and adorned with precious stones. The pike was surmounted by a crown of gold, enclosing within it a monogram of the two initial letters of the name of Christ.

Labat, Jean Baptiste, zhōn bāp'tēst lä-bä, French Dominican missionary and traveler: b. Paris 1663; d. there 6 Jan. 1738. In 1693 he went as a missionary to the French Antilles, landed at Martinique, and undertook the care of the parish of Macouba, which he superintended for two years, after which he was sent to Guadalupe. His mathematical knowledge recommended him to the governor there, whom he accompanied during a tour through the island to assist him in selecting the points best adapted for works of defense. On his return to Martinique Labat received the office of *procureur-général* of the mission, in which an opportunity was afforded him of displaying the whole extent of his useful activity, at the same time that he served the government by his mathematical knowledge. In 1705 he was sent to Europe on business of the order, and landing at Cadiz, surveyed geometrically and scientifically the environs and the whole coast of Andalusia as far as Gibraltar. He returned to Paris in 1716.

His 'Nouveau Voyage aux Iles de l'Amérique,' which has been translated into several languages, contains an account of the natural history, particularly of some of the smaller and less frequented islands; of their productions; the origin, customs, religion, and governments of the inhabitants. He also published a 'Nouvelle Relation de l'Afrique occidentale'; 'Voyage en Espagne et Italie'; 'Relation historique de l'Ethiopie occidentale'; 'Mémoires du chevalier d'Arvie.'

Labédoyère, Charles Angélique Huchet, shärl än-zhâ-lék hü-shâ lä-bâ-dwâ-yär, Comte de, French general: b. Paris 17 April 1786; d. there 19 Aug. 1815. He entered the army in his 20th year, and served with much distinction in Spain, Germany, and elsewhere. Napoleon raised him to the rank of general of division in 1815, and he fought with great courage at Waterloo. After the battle he hurried to Paris, and there distinguished himself by his hostility to the Bourbons. On the capitulation of Paris he followed the army behind the Loire, but returning to Paris, was taken, tried by court-martial, and shot.

Label, Union. See UNION LABEL.

Labezares, Guido de, gwē-dō dā lä-bâ-thâ'rës, Spanish adventurer: b. Bilbao, Spain, 1510; d. Manila 1580. He began his career in South America, from which he made a voyage to Java and Sumatra 1542. In 1550 he discovered the Bay Filipina, in Florida, and in the following year with Luna de Arellano visited and re-named the place Bay Santa Maria. He entered with Legaspi upon the project of conquering and converting the Philippine Islands. His success was complete in the matter of conquest and in 1574 he was appointed governor-general of Manila. By means of new fortifications he so strengthened the place against the Chinese corsairs and the Dutch pirates, that these were driven from the adjacent islands. In 1575 he took the position of lieutenant-governor, under a new governor-general sent from Spain, and kept his position until his death.

Labia'tæ, a natural order of dicotyledonous herbs or sub-shrubs distributed mainly in temperate climates. The species, of which there are more than 2,500, grouped in about 150 genera, are characterized by four-cornered stems; opposite, exstipulate leaves; two-lipped flowers generally in whorls, cymes or heads; and one to four achenes in a persistent calyx. They are noted for their volatile oils, which in many instances are of economic importance either as perfumes, or as flavorings. Some species are cultivated for ornament, but probably the best known are those which have been used for centuries for flavoring food, such as sage, thyme, savory, marjoram, mint, balm, and basil (qq.v.). The species used most frequently in perfumery are probably lavender, rosemary and patchouli. One species variously known as Chinese and Japanese artichoke, chorogi, and knotroot. *Stachys sieboldii* or *S. affinis* yields edible tubers which are eaten raw or cooked in Asia, France and to a small extent in the United States. Many labiates have at some time been reputed medicinal but are now rarely used except to disguise the taste of disagreeably flavored drugs. The best known genera represented in the United States are: *Nepeta* (catnip), *Mentha* (mint), *Origanum* (marjoram), *Salvia*

LABICHE—LABOR CONGRESS

(sage), *Thymus* (thyme), *Marrubium* (horehound), *Satureia* (savory), *Lavandula* (lavender), *Monarda* (horsemint), *Ocimum* (basil), *Melissa* (balm), *Scutellaria* (skullcap), *Lamium* (dead nettle), *Calamintha* (calaminth), *Teucrium* (germander), and *Trichostema* (bluecurls).

Labiche, Eugène Marin, è-zhān mä-rāñ lä-bēsh, French dramatist: b. Paris 5 May 1815; d. there 13 Jan. 1888. He wrote, chiefly in collaboration with other authors, upward of 100 plays, many of them very successful. They are mostly distinguished by extravagant plots, and are full of droll situations. In 1880 he was elected to the Academy, and after that date ceased to write for the stage. His dramatic works were collected in 10 volumes (1878-9). Among the best of them may be mentioned: 'The Italian Straw Hat' (1857); 'Le Voyage de M. Perrichon' (1860); 'Moi' (1864). Consult: Matthews, 'French Dramatists' (1901).

Lablache, Luigi, loo-é-jé lä-blásh', operatic singer: b. Naples, Italy, 6 Dec. 1794; d. there 23 Jan. 1858. He studied at the local Conservatory della Pietà de Turchini under the guidance of Valesis, and made his début as a bass singer, *buffo Napolitano*, in Fioravanti's 'Molinara.' Later he enlarged his repertoire by singing in grand opera, and appeared as Mercadente in 'Elisa and Claudio.' His reputation soon extended over Italy. In his 20th year, when the triumph of Rossini was at its height, he stood forth as the greatest interpreter of that master, and reached the summit of his fame. A medal was struck off in his honor at Vienna in 1825. For the next 17 years he annually appeared in Italian opera in London, Paris, and St. Petersburg. He was equally admirable in comic and serious operas, and the school of music which he opened in Paris had considerable success in handing on the traditions of his style.

Labor. See AMERICAN LABOR.

Labor, American Federation of. See AMERICAN FEDERATION OF LABOR.

Labor and Commerce, Department of. See COMMERCE.

Labor Bureau, more properly the bureau of labor, a sub-department of the Department of Labor and Commerce. Originally the Bureau of Labor was a part of the Interior Department, but at the creation of the new department by the Congress 11 Feb. 1903, the bureau was transferred. It was organized in 1885, and Carroll D. Wright, who had been very successful as chief of the Bureau of Statistics in Massachusetts, was appointed Commissioner of Labor. At the end of three years Commissioner Wright had made such signal success in the new department that the bureau was changed to the Department of Labor, with independent functions. It has issued annual reports, special reports and bi-monthly bulletins of great educational value.

Nearly every State in the Union also has a labor bureau, or department of labor, the oldest being that of Massachusetts, organized in 1869. Several of the State bureaus, particularly those of New York and Connecticut, maintain free employment agencies. The Federal and State bureaus had published up to October 1903 only 500 volumes on labor topics. These State bureaus have been kept remarkably free from partisan politics, and those have been decidedly

successful in the settling of labor disputes and in preventing strikes and lockouts. These organizations proved so successful that European nations soon followed the American example. In 1891 France organized a bureau of labor and in 1892 Germany followed with a labor commission. In 1893 a labor department under the direction of a Commission for Labor was instituted in England. Austria, Italy, Sweden, New Zealand, New South Wales and Canada have since established similar bureaus. Consult: Wright, 'The Workings of the Department of Labor,' and 'The Value and Influence of Labor Statistics,' in 'Monographs on Social Economics' (Washington 1901).

Labor Colonies, or agricultural communities, are common in Europe but almost unknown in the United States. They are maintained for the purpose of giving employment and training to individuals who, on account of misfortune or inefficiency, find it difficult to earn a living. In Holland there are four of these labor colonies, at Wilhelmsoord, Frederiksoord, Wilhelminsoord and Colony No. 7, which have been established for over half a century. They occupy 5,000 acres of land and have a membership of over 2,000. At La Chalmelle, France, is a colony established in 1892. It occupies 318 acres of land and has 300 colonists. In Germany there are 26 colonies all established since 1882. New Zealand has a government farm of 1,000 acres. In Belgium are two colonies which are practically penal institutions for vagrants and beggars. There are several colonies in England, and in the United States three small colonies have been established by the Salvation Army, one each in Colorado, California and Ohio. The most successful is the Colorado colony which has 150 members. The colony system in all the European countries is practically communism under government control, all the colonies being conducted on the co-operative plan.

Labor Congress, an assemblage, either national or international, of representatives of organized labor. In 1866 the first International Labor Congress was held at Geneva, Switzerland, about 60 delegates being present from England, France, Germany, Holland and Switzerland. The results of this meeting were the condemnation of the industrial employment of women, the advocating of technical education and the organization of mutual credit associations. At the congress of 1869, held at Basel, Switzerland, labor representatives were in attendance from Russia, Austria, Germany, France, England, Spain, Italy, and Switzerland. This assembly by a vote of 54 to 4 declared that landed property should be abolished. Other similar congresses were held at Dresden, 1871; The Hague, 1872; Paris, 1886; Berlin, 1891, and Zurich, 1897.

An International Socialist-Labor Congress was held in Paris in 1889. In 1891 a second Socialist-Labor congress was held at Brussels, at which 400 delegates were present from nearly every country in the world, including Canada and the United States. Among the topics discussed were: the eight-hour day, militarism, universal suffrage, and legislative protection of labor. At the congress of 1893 at Zürich, Switzerland, 385 delegates were present, and admission was denied to all avowed anarchists. The congress, now assuming definite organiza-

LABOR, COURT OF—LABOR LEGISLATION IN THE U. S.

tion, met in London in 1896, and arranged to meet every four years thereafter. The anarchists were again denied admission, and resolutions were adopted opposing standing armies, advocating the nationalization of land and the socialization of industry.

The next meeting of the International Socialist-Labor Congress was held in Paris, in 1900, when the assembly discussed the laws regulating strikes and boycotts and favored the abolition of the capitalistic class. Resolutions were passed favoring a fixed minimum wage and the nationalization of mines. The congress for 1901 held 14 Sept. at Amsterdam, discussed the following questions: General strikes; general rules of political socialism; trades unionism and politics; colonial politics; international arbitration; the relation of the trust question to the unemployed problem; emigration. Of this organization which meets every four years there is a standing committee known as the International Socialist Bureau, which meets annually. The meeting for 1903 was held in Berlin.

Various national labor congresses are held in several countries, particularly in England, where an annual convention has been held since 1868. Congresses of anarchists convening under the disguise of labor have been held at intervals in Lyons, Havre, Brussels, Barcelona and other cities. See also LABOR UNIONS; SOCIALISM.

Labor, Court of (Industrial Department of the National Civic Federation). At a conference of representatives of capital and labor, held in New York 17 Dec. 1901, under the auspices of the National Civic Federation (q.v.), a permanent board was appointed to settle differences between the employees and the labor unions. On this board were 12 representatives of organized labor, 12 representative employers and 12 leading educators, clergymen and public men. On 18 Dec. 1901 the committee organized on a permanent basis, with Senator M. A. Hanna as chairman, and Oscar S. Straus and Samuel Gompers, vice-chairmen. The following statement was issued, indicative of the purposes of the committee:

"This committee shall be known as the industrial department of the National Civic Federation. The scope and province of this department shall be to do what may seem best to promote industrial peace; to be helpful in establishing rightful relations between employers and workers; by its good offices to endeavor to obviate and prevent strikes and lockouts; to aid in renewing industrial relations where a rupture has occurred. That at all times representatives of employers and workers, organized or unorganized, should confer for the adjustment of differences or disputes before an acute stage is reached, and thus avoid or minimize the number of strikes or lockouts. That mutual agreements as to conditions under which labor shall be performed should be encouraged, and that when agreements are made the terms thereof should be faithfully adhered to, both in letter and spirit, by both parties. This department, either as a whole, or a sub-committee by it appointed, shall, when requested, act as a forum to adjust and decide upon questions at issue between workers and their employers, provided in its opinion the subject is one of sufficient importance. This department will not consider ab-

stract industrial problems. This department assumes no power of arbitration unless such powers be conferred by both parties to a dispute. This department shall adopt a set of by-laws for its government."

The committee since its organization has been instrumental in settling numerous troubles and disputes between capital and labor. See NATIONAL CIVIC FEDERATION.

Labor Day, in the United States, the first Monday in September, a legal holiday in all the States and Territories except Arizona, Mississippi, Nevada, North Dakota, and Louisiana. The celebration of this day was inaugurated by the Knights of Labor, who in 1882 held a parade in New York, and again in 1884 when resolutions were passed to hold all parades on that day. Workingmen of all organizations then began agitation to have the day made a legal holiday, and in 1887 the first law to that effect was passed in Colorado. The day is celebrated by parades and by meetings addressed by prominent labor leaders. In Europe the celebration of the first of May as Labor Day was begun in 1890 with a demonstration in favor of the eight-hour day; it was at that time and for a few years later much feared and violently opposed by the various governments, and there were many clashes between the police and soldiers and the workingmen. It is now usually celebrated without trouble by parades, large meetings, and the general cessation of work. In the United States, May Day is celebrated by the Socialist-Labor party, but there is no attempt to cease work on that day.

Labor Exchanges, a name erroneously applied to employment bureaus (q.v.). It was also a term given to a class of institutions founded by the followers of Robert Owen (q.v.) in 1832-5. These were designed to bring about an exchange of products of labor without the intervention of money. Many stores were founded but the plan was soon found impracticable.

Labor Legislation in the United States. The problem of protecting the laboring classes against the employing class is of relatively late development in the United States, owing to the superior prosperity of the laborers, the rapid increase in employments and competition for workmen. Of course, direct United States laws on the subject cannot exist, all such legislation being reserved to the States; the most the government can do is to set an example of short hours, high wages, and sanitary conditions in its own workshops or other employments, and make enactments for the District of Columbia. State legislation is too scattered and discordant to present in full; only a classification of the subjects of legislation will be attempted.

The Contract in General.—One of the fundamental principals of the common law, though not expressed in statutes, is that long contracts for personal service, which might end in a form of serfdom, will not be enforced beyond two years; in one State nothing beyond one year is enforceable; which implies that under these limits it could be, but no case has yet arisen. The notice to be given on quitting employment has been regulated in several States by an enactment that an employer shall give an employee the same notice which he exacts by withholding wages, requiring bonds, etc.

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Rate, Form, Period, etc., of Wages.—There is no statute in any State fixing the rate of wages, nor would it be constitutional, in all probability. The nearest approach is an Indiana statute of 1899 providing a minimum of 15 cents an hour for manual labor. It is often provided in municipal orders, however, that work on contracts shall not be paid at less than current local rates. The wage-paying period has in some cases been legally fixed as weekly; it is not certain that this is either constitutional or wise. More common and of much less doubtful utility are the laws in some States forbidding the payment of wages in orders for goods, or anything but cash, and prohibiting companies from operating or being interested in stores or supply establishments. Maryland and Illinois have this in action; the Pennsylvania statute was held unconstitutional. Laws regulating fines and deductions, weighing, etc., have been enacted, and "screen laws" for the coal mines.

Hours of Labor.—This has been and is one of the most persistently fought of labor questions, but for adult work it has not been very successful thus far on the State-arena, the only statute establishing a general 8-hour law with enforced payment for overtime—that of Nebraska—having been declared unconstitutional. Wyoming by constitution, however, and Missouri and Utah by statute, have established an 8-hour day for the mines; and it is usual to fix 8 hours as a day's work where the contract does not specify any. This is also becoming customary in public work for States and cities, and will doubtless become universal. The State also claims the right to regulate hours in unsanitary or dangerous occupations. On the subject of children's labor, the Northern States east of the Rockies have generally a full and systematic body of legislation; efforts are making by the best citizens of the South to have its States adopt similar laws. These statutes restrict the labor of children under certain years (10 at lowest, more commonly 12 or 14) to a usual 10 hours a day, and 55 to 58 hours a week; 12 hours in Pennsylvania, but even there only 60 hours a week. It is also usual to order the hours arranged so as not to interfere with school hours, unless the children have reached a certain standard. Some States make these laws apply to adult women as well; some prohibit women's labor in the mines altogether.

Personal Liberty.—A number of enactments have been made to prevent intimidation of workmen by threats of loss of employment, etc.; and by pay envelopes or placards in work-rooms drawing menacing pictures of shutting down, discharging men, etc., if certain political results ensue. Forbidding men to join unions, forcing them to contribute to benefit societies, or to employ a company physician, etc., are legislated against.

Government by Injunction (q.v.).—The use of injunctions and proceedings for contempt to suppress labor riots has greatly incensed the workingmen, and in Kansas a statute has been passed which goes so far as practically to make it impossible to enforce any contract that does not sound in damages.

Health, Safety, Moral Conditions, etc.—The evils of the sweat-shop—tenement manufactures, mainly confined to clothing—have drawn out legislation, either extending the factory acts to them, or restricting the manufacture to mem-

bers of the resident family and requiring a license. In factories, there are laws providing a given air space for each hand, and machine appliances for removing dust, guards for belts, shafts, dangerous machinery, elevators, etc., prohibition of cleaning machinery while in motion, sometimes of women or children cleaning it at all, fire escapes, etc. See FACTORIES AND FACTORY INSPECTION.

Employers' Liability.—This branch of law in America is almost entirely the creation of the past 20 years; so much so that a great and flourishing branch of accident insurance, unknown a generation ago, now takes in many millions of dollars in premiums annually. The employer has always been liable in damages to an employee for accident resulting from his own negligence, or defects in his plant, as from breaking machinery, bad floors, etc.; but not from the negligence of fellow employees. The latter has of late years been changed, so that the employer is now liable for all accidents in his service except where the employee's own negligence is the cause; and the large liability superinduced makes it needful to insure the hazard.

Labor, Organized. See UNIONISM.

Labor Union, The American, a Socialist-Labor organization founded in May 1898, as the Western Labor Union. At a convention held in Denver, Colo., in 1902, the scope of the organization was widened and the name changed. It favors international socialism, and the government of the body is more centralized than ordinary federations of trade unions. The Union is composed largely of trade unions in the States of Colorado, Idaho, Montana, Washington, and Wyoming. In 1903 it had 173 local unions, 5 district unions, and a membership of 150,000. The official organ is the 'American Labor Union Journal,' published at Butte, Mont.

Labor Unions. See UNIONISM.

Laboratory (from the mediæval Latin *laboratorium*, meaning workshop). The word is used to denote any room or building devoted to experimental investigations in technics and the sciences, or to the teaching of scientific and technical knowledge by means of experiments. The term is used to denote the work-room of a manufacturing chemist, or to the testing-rooms of an industry. In early times laboratories were used by the priesthood, who tried to throw a mantle of secrecy about them. Chemical operations were carried on in them and drugs and potions were made in them. Out of these early laboratories grew those of the Middle Ages. In this later period they were devoted to astrology, the making of drugs, potions and charms and to the search for the philosopher's stone by means of which it might be possible to change the baser metals into gold. Some of these laboratories were very important in their day, having the nobility for patrons, or being maintained at the public expense.

In 1683, a laboratory for academic instruction was opened at the University of Altdorf. Many private laboratories were established about this time, but their rapid development for instruction and research did not begin until the 19th century.

Among the first laboratories established, open to students, were those of Purkinje, who established a physiological laboratory at

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Breslau in 1825; and the chemical laboratory established through the efforts of Baron von Liebig at the University of Giessen in the same year. The first physical laboratories for students were founded about 1846; one at Heidelberg, by Philipp Gustav Jolly; and one at the University of Glasgow by William Thomson — now Lord Kelvin.

The introduction of the laboratory into the educational system of the United States was made by the Rensselaer Polytechnic Institute, which established a chemical laboratory at about the same time as that established at the University of Giessen; and by the Massachusetts Institute of Technology, which also established a chemical laboratory. The movement for the establishment of laboratories in the United States was independent of that in Europe.

Among the great laboratories of the world may be noted that of the Royal Institution, established in 1800 by Count Rumford, which was to be devoted to the applied sciences, but which soon became the seat of great activity in researches in pure science, conducted by such men as Davy, Faraday, and Tyndall. The Physikalische Reichsanstalt, in Charlottenburg, near Berlin, is a very famous laboratory where there are departments devoted to research in pure science, and other departments for the study of the applications of science to industrial pursuits. In 1875 a Committee of Weights and Measures, made up of representatives of 18 nations, was organized for the purpose of reproducing and furnishing international metric standards to the members. A laboratory for their manufacture and for research was established near Paris. Great Britain has placed the control of a recently founded national laboratory, where standards of weights and measures are to be kept, duplicates made, instruments tested, and research is to be carried on, with the Royal Society. In the United States the Smithsonian Institution (q.v.) was established in 1846. Many important lines of research have been developed there, out of some of which have grown up some governmental departments; as the United States Weather Bureau and the United States Fish Commission. The United States government has established, by act of Congress, approved 3 March 1901, a National Bureau of Standards, a suitable building and equipment also being provided for. The bureau has the custody of the standards of weights and measures, and has power to manufacture duplicates, multiples and submultiples. It also has the power to officially test and calibrate physical and chemical apparatus and issue certificates for them. Research is to be carried on, when of great importance to commercial and scientific interests.

Laboratories for studying science by means of experiment, and for research, have been established in practically all American institutions of learning. In many preparatory schools and in an ever-increasing number of high schools, elementary laboratories are added for the study of physics, chemistry, and biology.

Laboratories for research and for testing form a part of many industrial enterprises, as in the manufacture of steel. The material is tested chemically at different stages of the process in order to determine the treatment in a subsequent process. Physical tests

are made of its strength and density. Investigations are carried out with respect to the effect of different processes of manufacture on its physical characteristics. Another example is the laboratory of the manufacturing chemist, where he tests his product and seeks for new, better and cheaper processes of manufacture.

Many industries of to-day are based on processes devised and worked out in laboratories for research. Some examples are the great plants at Niagara Falls, where metallic aluminum, calcium carbide, sodium hydrate and many other compounds are made. The basis of the progress in applied electricity is research in physics and chemistry. In many lines of industry scientific research in public and private laboratories has made possible new and better processes. In those countries where there is the greatest activity in research in science and its applications there is also the greatest industrial activity.

Research in the biological sciences has helped to a better understanding of life and to its prolongation. The causes of many infectious and contagious diseases have been discovered, and effective methods of prevention and of combating them have been found. The Pasteur institutes in many large cities all over the world are witnesses to these facts.

A general outline and some of the details of construction, equipment, and uses of a few of the most common types of laboratories found in educational institutions of the present day are given below. Many laboratories where excellent work is being done are very much simpler than those described; and, on the other hand, some are much more elaborate in construction and equipment. Some features are common to them all, one of which is the lecture room, where experimental demonstrations are given before many students at one time.

Biological Laboratory.—It is necessary in the present instance to dwell but briefly on any particular subdivision of laboratories devoted to the study of biology. Biological laboratories in Europe were established during the early part of the last half of the 19th century. Louis Agassiz led the movement in the United States in the establishment of biological laboratories, by establishing a zoological laboratory at Harvard.

Agassiz also developed the modern marine laboratory which has led to the establishment of many such laboratories in all parts of the world. The researches in these laboratories have been of greatest value in the biological sciences. Among the marine laboratories of the world must be enumerated the great laboratory established in 1872 by Dr. Anton Dohrn at Naples. Specialists from all parts of the world go to this laboratory to do research work. The United States Fish Commission has established two very important marine laboratories in the United States: one at Woods Holl, Mass., the other at Beaufort, N. C., in 1899. Woods Holl was the centre of activity in 1871 and again in 1875. The first building of the present fish culture and experiment station was completed in 1884. This laboratory has been open to voluntary investigators, tables being assigned to them. The investigators have numbered among them men from the principal universities of the country, and much valuable work both of economic and scientific value has been done

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there. The marine laboratory established at Beaufort, N. C., promises to be one of the greatest, if not the greatest, biological station in the world; larger than the one at Woods Holl or the one at Naples on the Mediterranean.

A second very important marine biological laboratory for research exists at Woods Holl, where scientists from many institutions congregate. This laboratory is devoted entirely to research. There are many other important biological stations along the Atlantic, Pacific, and Gulf coasts and a few on the Great Lakes.

The special appliances necessary to meet the needs of marine laboratories, are boats, both large and small, nets, apparatus for obtaining the vegetable as well as the animal life of the salt and fresh water bodies, and aquariums.

The epoch-making researches of Pasteur in France on bacteria have led to the establishment of important bacteriological laboratories throughout the world. The universities and colleges in the United States have many laboratories devoted to teaching and investigation along the different groups of the biological sciences.

The botanical laboratory is devoted to the study of the life of plants, and their classification according to their distinguishing characteristics and structure.

The laboratories for the whole group of biological sciences have much equipment in common. The laboratory rooms should be well lighted, preferably with north light and with window bars done away with as much as possible; the building should be situated so as to have a low horizon. This is important in microscopic and microphotographic work, in order to get a uniform lighting of the slide on the microscope stage. The rooms should be provided with tables, on which is placed a full equipment of reagents, staining and preserving solutions. Dissecting instruments are among the individual needs of the students. The microscopes for the more advanced work should have three objectives, one of comparatively low power, another of higher power, and the third an immersion objective. Microtomes are needed for cutting sections, to be mounted on slides for examination under the microscope. The photomicrographic camera aids very materially in the careful, systematic study of specimens. The negatives thus obtained are available for making lantern slides for projection purposes and for making enlarged photographs. In some lines of research work, as in bacteriology, culture media, in which the particular form of life may grow and multiply, may be used. Often the cultures must be kept for hours at a certain temperature, thus necessitating incubators, of which the temperature is regulated by thermostats. Frequently rooms are set apart for cultures. Dark rooms are essential for the development of negatives resulting from the photographic work.

Chemical Laboratory.—The chemical laboratory is one of the most important factors in the educational and industrial systems of our civilization. The rooms of the chemical laboratory should be well lighted and ventilated. Special lines of work should be isolated. The lecture room for demonstration purposes should be much the same in its general features as the physical lecture room (q.v.). The lecture room should be supplied with dif-

ferent gases, including common illuminating gas, oxygen, and hydrogen. The oxygen and hydrogen are generally supplied in heavy steel tanks under high pressure. A demonstration lantern should be conveniently placed. The table top should have one or two holes in it connected to the suction fan for carrying off fumes and gases, thus keeping them from being disseminated through the room.

The inorganic laboratories, for elementary purposes, may be divided into three principal divisions: first, that devoted to the study of the simple reactions by the beginner, who there learns experimentally what takes place in the simple reactions, as that of the production of hydrogen gas by pouring sulphuric acid on zinc, forming zinc sulphate and liberating the gas. The second division is that part devoted to qualitative analysis, where more complex reactions are studied and where the student learns to recognize and to test for the presence of the different elements. Under the third division is found quantitative analysis, which, as the name implies, is devoted to the study of the quantitative relations of compounds.

The work in these three divisions leads up to the more complex work of organic chemistry and research work. The equipment of these laboratories will give a general outline of the whole. Wide top tables should be provided. The tops should be impervious to water and as little acted on by acids as possible. Alberene stone is excellent material for such purposes. A good construction is to have the tops slope a little from both sides to the centre line, where a trough is placed to carry off the wastes to the sewer. Racks for the storing of bottles containing reagents should be placed so as to be easily reached by the students from both sides of the table. Beneath the top should be drawers and shelving so subdivided that each student may keep his apparatus separate. The tables should be provided with gas and water, with plenty of taps, and with electrical connections. Means should also be furnished for boiling under reduced pressure. For the experiments where noxious gases are given off, hoods should be provided, the bases being of the same material as the table tops, the sides and top of fixed glass with a glass window that may be opened in front. For ventilation within the hood there should be openings to a flue connected with a blower which produces a suction of the gases from the hood. One of the openings should be well toward the top and the other at the bottom of the hood. If artificial lighting is required it should be from above the glass top. Plenty of stop-cocks for gas, water, and suction should be provided for each hood.

Among the independent rooms needed, are those for the following purposes: A hydrogen sulphide plant is an absolute necessity, and it should be isolated to the extent of having a well ventilated room of its own. It should, however, be situated as conveniently as possible to the main divisions of the laboratory. Sometimes it may be advantageous to pipe the gas to different rooms. Near the quantitative laboratory should be a balance room well stocked with analytical balances supported on solid tables or wall brackets. A combustion room and a furnace room are often required. The furnace room should be

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so located as to get a good draft or so as to be connected to a suction fan system. Dark rooms for photography and spectroscopy should have a dead black finish, and those for photography should be supplied with means for obtaining ruby light.

The study of the spectrum of gases makes it necessary to have a good induction coil to produce a spark spectrum, which may be viewed by the eye, or which may be photographed. The range of temperatures at which chemical phenomena are now studied calls for very high and very low temperatures, which means that the electric furnace and a liquid air plant are often desirable. Apparatus for distillation under different pressures, and for obtaining constant temperatures are very necessary in some phases of the work. The rooms for gas analysis should be so situated as to make it possible to have but small temperature fluctuations. A north exposure, thus getting rid of direct sunlight and yet getting good illumination, is preferable. The principal part of the equipment needed for gas analysis by the Hempel method includes gas buretts, to measure volumes, absorption pipettes for the different reagents used to absorb different gases, combustion pipettes and oxygen generators.

The physical chemistry laboratory requires much apparatus and equipment needed in physics and in the other divisions of chemical work, including analytical balances, thermometers, barometers, manometers, calorimeters, thermostats, motors, stirring gear, refractometers, spectrometers, apparatus for studying polarized light, ammeters, voltmeters, resistances, and many other pieces. Among the subjects studied in the student laboratory are density, viscosity, vapor pressure, boiling and freezing points, heats of fusion and vaporization, critical temperatures, pressures and volumes, heats of combustion, solubility and the various divisions of electrolysis and electro-chemistry.

Electrical Laboratory.—The student and investigator in the field of electricity should have a thorough grounding in general physics and physical laboratory methods. The student in the electrical laboratory becomes acquainted with the relations of electric currents, electromotive forces and resistances; and the production and transmission of electrical energy, electrical quantity, capacity, magnetism and the relations between electricity and magnetism. The laboratory should be of strong construction on account of the lines of shafting and the heavy machines used. In the general laboratory will be found for purposes of investigation: dynamos of the various direct and alternating current types; direct and alternating current motors, the latter covering synchronous, two-phase and three-phase motors, induction motors, and rotary converters. Portable and variable inductive and non-inductive resistances; portable and fixed instruments for measuring current, electrical pressure or potential and power should be plentifully supplied. The fixed machines, instruments, the private rooms and tables should have lines of wire connecting them with a central switchboard through which any desired grouping of stations may be made. Among the separate departments may be one for testing and studying transformers; one for investigating the magnetic properties of iron, steel and other

metals; a potentiometer room in which to test and calibrate the instruments used in electrical measurements. Some interesting and important parts of the work are the investigation of the resistance and strength of insulators and conductors; the study of condensers and their effect in a circuit; the study of self and mutual induction and the measurements of them. Separate rooms which can be made dark, the walls of which absorb as much light as possible, or which can be made any color desired by a proper arrangement of coverings, where work in lighting and photometry may be performed, are also important parts of the equipment of an electrical laboratory.

The electrical engineering student should find it possible to make tests in all lines of his profession, approximating, as nearly as possible, actual working conditions in the commercial world. In order to give the greatest usefulness to the laboratory, the equipment should be kept abreast with the advances in the best engineering practice.

Engineering Laboratory.—Engineering laboratories have been developed within the past forty years along all lines of engineering and technical education. The divisions are many, but only a few of them will be considered here. The electrical engineering laboratory has been discussed above under the head of *Electrical Laboratory*. Under the division of Mechanical Engineering may be placed railroad engineering, marine engineering and the like. Among the subdivisions under Civil Engineering are mining engineering, hydraulic engineering, sanitary engineering and bridge engineering, for all of which laboratories have been developed.

The mechanical laboratory, as its name implies, treats of mechanics, the sources of mechanical energy and its transmission. The laboratory should be a solid structure with massive foundations for the heavy machines used. Boiler rooms, engine rooms, material testing rooms, and general experimental rooms on mechanical devices, are the requisites. The boilers tested comprise fire-tube, water-tube, and shell boilers. Tests are made of fuels, as to their steaming qualities, the ash, and flue gases, by means of calorimeters, gas meters, thermometers, thermo-elements, and balances. Engine tests may be made on many steam motors comprising steam turbines, simple slide valve, Corliss, and compound engines of high and low pressure types. For these tests are needed steam gauges, thermometers, indicators communicating directly with the inside of the cylinders, together with "reducing motions" for obtaining automatic records of the steam pressure within the cylinders during a complete stroke, from which data may be obtained by means of which to compute the energy put into the engine; and dynamometers to measure the output in useful work.

Another department is devoted to internal combustion motors. Under this class are included hot air engines, oil and gas engines, which require dynamometers, gas meters, and other measurers of the fuel supplied, and means for testing the products of combustion. In the mechanical laboratory, water motors, fans, blowers, air compressors, compressed air machines and tools, different methods of power transmission, as by shafting, gearing,

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belts, ropes and chains, and the like, are studied. Measurements of the coefficients of friction of different substances are found, and the effects of lubrication by different substances are investigated. Lubricants are tested under various conditions, such as at various temperatures, pressures, and in the presence of different vapors or gases. The testing of materials is common to mechanical and civil engineering laboratories. It will be outlined under the latter head.

In the civil engineering laboratories, calculating and measuring instruments are tested and calibrated. Among these instruments are transits and levels, and all instruments having graduated circles, cross-hairs and spirit levels; steel tapes; chains and bars for measuring lengths; chronometers for measuring time; barometers and thermometers. Here also is studied the magnetometer; and by means of it the strength of the horizontal component of the earth's magnetic field. The variation and dip of the earth field are also investigated. The "acceleration of gravity" is determined.

In the hydraulic division of these laboratories are studied the flow of water in pipes, "skin friction," the flow of water through different orifices under different conditions, the flow of water over weirs and its measurement. This is very important in irrigation.

The laboratory devoted to the testing of materials is a very important one in all engineering work. All kinds of materials used in engineering work are tested. The apparatus required comprises machines for testing the resistance to compression, of tensile strength, of torsion and flexure of materials. Cements are tested for their resistance to tension and compression and for the length of time required for them to set. For the last test named, automatic apparatus has been devised which registers time and amount of "set." Forms in which to mold the briquettes, and water tanks in which to immerse them for setting, are among the required equipment. Tests on concretes are made in a similar manner. Abrasion machines are used to make tests on paving material and other material subject to wear.

Physical Laboratory.—The requirements of the modern physical laboratory depend greatly upon the work to be done, but a few of the chief requisites that are common to all may be noted. The housing and equipment of a physical laboratory is of very great importance. The building in which the laboratory is to be located should be so situated as to reduce to a minimum all jar and tremor, and to do away with all outside magnetic disturbances, such as those due to electric car lines.

Many rooms are needed for special divisions of the work; such as constant temperature rooms, which require special precautions in design and construction and which are best situated below ground. Special rooms are demanded for radiometers, spectrometers, potentiometers, and such other instruments as require constant conditions to insure good results. Dark rooms are necessary for work in light, which includes experiments requiring diffraction gratings, photometers and the phenomena of light in general. Since photography has become of very great practical importance, fully equipped dark rooms are desired; also a sky-light room where enlargements and reductions of negatives may be made, and lantern slides prepared. It should be possible

to introduce sunlight into some of the rooms.

A lecture room in which experimental demonstrations may be given is a necessity, and much attention should be given to its arrangement. The lecture room should be well lighted but should be provided with arrangements for readily darkening it. The experimental lecture table should be placed so as to be easily seen from all parts of the room. This table should have water, gas, air blast, suction, water motors and other motors, sink, and terminals for obtaining direct and alternating currents. A solid masonry pier upon which to set up delicate apparatus and that requiring no vibration, should be provided. The table tops should be impervious to water and so far as possible acid-resisting.

An apparatus room in which is kept demonstration apparatus should be situated conveniently to the lecture room; general apparatus may also be kept there. The opening between the apparatus room and the lecture room should be large enough to admit the passage of large pieces of apparatus, and also to allow experiments to be set up on wheeled tables in the apparatus room, then wheeled directly into the lecture room.

Separate rooms should be provided for research work. It is desirable that it be possible to connect some of the rooms in suites, and to provide dark rooms for some of the suites.

Research rooms should contain water and gas, both ordinary illuminating and acetylene gas. They should have electrical connections to a central switchboard sufficient to obtain various types of current at one time. The floors of the building should be solid. Stone tables built in the walls form good supports for instruments, but there should be provided in some cases stone piers with independent foundations.

The general laboratories should have plenty of light and should be provided with separate rooms for some classes of work, as in light and sound, where it is often necessary to have darkened rooms. A heat bench or table should be provided; it should have an impervious top with enough pitch to drain into a central trough or hole to conduct away the waste. A rack with hooks above the bench, from which to suspend thermometers, is convenient. The rooms should be well supplied with tables, and along the walls stone shelving built in the walls, will be found useful. The dirt incident to primary batteries may be concentrated if all the cells be kept together, their terminals leading to a switchboard to which are connected the terminals of lines leading to the various stations in the rooms.

Some of the apparatus needed may be noted: projection lanterns for demonstration purposes; pulleys; weights; pendulums; machines for studying the acceleration of bodies; balances of different capacity and sensitiveness; vacuum pumps; pressure pumps; apparatus for comparing densities of substances; apparatus for testing the gas laws; calorimeters; thermometers; hydrometers; dividing engines; chronometers; chronographs; standard tuning-forks, some electrically driven; resonators; sirens; lenses; mirrors; prisms; spectrometers; radiometers; photometers; permanent and electromagnets; electrosopes; electrometers; many types of galvanometers, some for the measurement of electrical differences of potential or pressure, some for measuring current, and others for measuring quantity; ammeters; voltmeters; wattmeters;

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bridges, for measuring resistances; condensers; Leyden jars; electric machines; potentiometers; and a plentiful supply of standard cells and resistance boxes.

The laboratory should also have storage batteries, and, if necessary, have its own dynamos in order to procure direct and alternating currents. An acetylene gas plant, and a compressor and liquefier for obtaining liquid air and other gases, are becoming necessary parts of the general equipment of a Physical Laboratory. A plant for the production of oxygen and hydrogen is also often desirable. A workshop in which to repair and build apparatus is a great convenience. The wiring and plumbing should be open and accessible as possible. All dark rooms as well as other rooms should be well ventilated, as it is often imperative for an observer to be confined in a room for hours at a time. Further reference to physical laboratory equipment will be found under the head of *Electrical Laboratory*.

Psychological Laboratory.—Since the establishment of the first psychological laboratory in Leipsic in 1875, by Wilhelm Wundt, where one room was devoted to apparatus and research, the development of the psychological laboratory has been rapid. One of Wundt's first students, G. Stanley Hall, established the first psychological laboratory in America at Johns Hopkins University in 1881.

The requirements of the psychological laboratory have increased very rapidly with the development of the subject, until its housing and equipment has become a problem of great importance and interest. Many rooms and much equipment are now required for a detailed study of the various subdivisions of the subject. Beside the rooms necessary in teaching psychology by means of experiments, other rooms for research are needed. Quiet and relaxation being often necessary, it is important to so arrange the rooms that the work of one student will in no way interfere with that of another student. The separate rooms should be provided with gas, electric lights, and water. Where absolute quiet is required, piping of all kinds should be excluded, the heating being done by indirect radiation if necessary, and only incandescent electric lighting being used. The rooms should be wired for electrical inter-communication between those which may likely be desired to be used in suites. They should also have wires leading to the rooms where chronometers and electrical recording devices are located.

For the study of the sensations of light and the eye, its capacity and limitations, suites of rooms are desirable in many instances. These rooms should be capable of being either well lighted or darkened to any desired degree. The equipment of this part of the laboratory includes models of the eye and the muscles governing its movements, sectional models; apparatus for studying color sensations, color mixing, color blindness, contrast, brightness independent of the color sensation; apparatus for studying optical illusions, the sensitiveness of the retina at different points, the sensitiveness of the eye to changes in position, the sense of location, and the imperfections of the eye; and apparatus for studying reactions and reaction times.

The sensation of sound requires isolated rooms where the noises produced may not reach other parts of the laboratory, and for certain

parts of the work, rooms that are sound and light proof. In this part of the laboratory the sensitiveness, range, and analyzing power of the ear are studied. The equipment for the work in sound comprises models of the ear; instruments for producing sound, such as tuning-forks, sirens, organ pipes, and other sources of vibrations; and resonators for analyzing complex sounds.

Other rooms are needed for studying the sense of heat and cold, pressure, pain, and the locations of the various end organs. The apparatus necessary is that required to produce the corresponding sensations. The effects of different sensations on the respiratory organs and heart action is another subject for investigation. Other parts of the laboratory are devoted to the senses of taste and smell. The equipment comprises the substances with which to test the various parts of the tongue, and also substances to produce different odors.

Among the special pieces of apparatus necessary may be mentioned the chronometer, the chronograph, electrically driven tuning-forks, sources of mechanical and electrical energy, and induction coils.

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Labori, Fernand Gustave Gaston, fér-nān güs-tav gás-tōn la-bô-rē, French lawyer and editor: b. Rheims 18 April 1860. He studied at the Rheims Lycée and for two years in Germany and England; took his degrees in the law faculty of Paris in 1881 and 1883, and was enrolled at the bar of the court of appeals in 1884; was secretary of the conference of advocates in 1887-8; took a high professional rank; and was especially prominent as counsel for the defense in notable cases, as the libel action by Compayré against Numa Gilly, and the trials of the anarchists Duval and Vaillant. In 1898 he defended Emile Zola (q.v.), accused of libeling the army and the president of the republic in the letter concerning the Dreyfus case. He was junior counsel to Demange in the defense of Dreyfus at the trial at Rennes in 1899, and thoroughly confuted his opponents by his logic and his brilliant cross-questioning. He did not make the final plea, but his 'Notes de Plaiderie' were published in the 'Compte-rendu Sténographique In-extenso du Procès Dreyfus à Rennes.' On 14 August, while on his way to the court, he was dangerously wounded by a revolver bullet fired by a fanatic or mercenary. He was shortly enabled, however, to continue the case. In 1903 he defended the Humbert swindlers (see HUMBERT SWINDLE, THE). He was editor-in-chief of the judicial daily *La Gazette du Palais* in 1888-94; established the 'Revue du

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Palais' and 'Grande Revue' in 1897; and published a 'Répertoire encyclopédique de Droit Français,' in twelve volumes (1898). See DREYFUS, ALFRED.

Labouchère, là-boô-shâr', **Henry**, English politician and editor: b. London 1831. He was educated at Eton; was in the British diplomatic service in 1854-64, being at one time a member of the British legation at Washington; in 1865-6 sat in Parliament for Windsor; was then unseated on petition; but represented Middlesex in 1867-8 and Northampton in 1880-1902. During his parliamentary career he strongly advocated Home Rule. He was at one time part proprietor of the London *Daily News*, to which he contributed letters from Paris during the German siege (1870-1) over the signature 'The Besieged Resident.' In 1876 he established and became editor of 'Truth,' a weekly journal in which he has expressed his opinions with great vigor. Indeed, as both parliamentary speaker and journalist, Labouchère gained an important place in English public life through his wit and incisiveness.

Laboulaye, Edouard René Lefebvre, à-doo-ar ré-nâ le-favr la-boô-lâ, French publicist and jurist: b. Paris 18 Jan. 1811; d. there 25 May 1883. He studied law and in 1842 he joined the Paris bar. He was a close student of the great German writers on jurisprudence, whose works and researches he introduced to his countrymen in a series of able essays, written in an admirable style. The Academy of Inscriptions and Belles-Lettres crowned his 'Histoire du Droit de Propriété Foncière' (1839), and elected him to its membership in 1845. An 'Essai sur la Vie et les Ouvrages de Savigny' (1840), was followed by 'Recherches sur la Condition civile et politique des Femmes depuis les Romains jusqu'à nos Jours' (1843), and an 'Essai sur les Lois criminelles des Romains concernant la Responsabilité des Magistrats' (1845), both crowned by the Academy of Moral Sciences. In 1849 he was appointed professor of comparative legislation of the Collège de France. After the foundation of the Second Empire he constantly strove to rouse opposition to it, and in several published works as well as in his lectures held up the American constitution to the admiration of his countrymen. He sacrificed his popularity, however, by his support of the plebiscite in 1870, and soon afterward he resigned his chair at the Collège de France. After the fall of the Empire he was elected for Paris in 1871. In 1875 he was elected a life senator. Besides the works above-mentioned he wrote: 'Histoire des Etats-Unis d'Amérique' (1854); 'Etudes Contemporaines sur l'Allemagne et les Pays Slaves' (1854); 'Souvenirs d'un Voyageur' (1857); 'Liberté Religieuse' (1858); 'Etudes sur la Propriété Littéraire en France et en Angleterre' (1858); 'Abdullah' (1859), an Arab romance; 'L'Etat et Ses Limites' (1863); 'Paris en Amérique' (1863), an ingenious and extremely popular satirical romance; 'Contes Bleus' (1863), a series of admirably told tales; 'Nouveaux Contes Bleus' (1866); 'Prince Caniche' (1868), another extremely popular satirical novel; 'Contes et Nouvelles' (1868); 'Discours Populaires' (1869); 'Questions constitutionnelles' (1872); 'Lettres politiques' (1872); 'La Liberté des Enseignements' (1880); and 'Trente Ans d'Enseignement au Collège de France' (1888), a

posthumous collection of lectures. He translated into French several of Channing's works and the 'Memoirs and Correspondence of Franklin.'

Labrador, läb-râ-dôr', a large peninsula at the northeast of the North American continent, lying between Hudson Bay and the Gulf of Saint Lawrence, extending from lat. 49° to 63° N., and from lon. 55° to about 79° W.; greatest length from the Strait of Belle Isle to its most northern cape, Wolstenholme, 1,100 miles; area, 420,000 square miles; pop. about 6,000, collected chiefly at the Moravian missionary stations of Nain, Okkak, Hebron, and Hopedale.

The Atlantic coast is stern and precipitous (1,000 to 4,000 feet high), entirely destitute of vegetation, deeply indented with narrow fiords, and fringed with chains of rocky islands. The inner parts have been but very imperfectly explored; the greater part consists of a plateau, about 2,000 feet above sea-level, and mostly covered with fine forest trees, firs, birches, etc. Numerous lakes, including Mistassini, also exist inland, and, connecting with the rivers, afford in summer continuous waterways for great distances. There are numerous rivers, 200 to 300 miles long and 2 and 3 miles wide at their mouths, flowing toward the Atlantic and Hudson Bay. The Grand Falls on Grand River are believed to be among the largest in the world, and are calculated to be little short of 2,000 feet in height. The rivers abound in fish, especially salmon and whitefish. The principal fur-bearing animals are bears, wolves, foxes, martens, otters, beavers, lynxes, etc., which are trapped by the inhabitants in winter. Of the mineral resources little is known; but iron and labradorite are abundant. The climate on the coast is very rigorous, owing mainly to the ice-laden Arctic current which washes the shores. The short three months' summer is marred by the swarms of mosquitoes and black flies. The mean annual temperature at the missionary stations varies from 22° to 28°. The winter is dry, bracing, and frosty. Since 1809 the coast region has been annexed for administrative purposes to Newfoundland. The remaining parts of the peninsula are designated the Northeast Territory. By far the most important wealth of Labrador is its fish—cod, salmon, herring, and trout. As many as 30,000 fishermen from Newfoundland, Canada, and the United States visit its fishing grounds in the season. The annual catch is valued at more than \$5,000,000. The coasts of Labrador were probably visited by the Norsemen about the year 1000; they were again sighted by Cabot in 1498. In 1500 a Portuguese navigator, Cortereal, seems to have visited it and to have given it its name, which means "laborers' land." Civilized man is found at a few settlements on the Saint Lawrence and Atlantic coasts, and at some widely separated posts of the Hudson's Bay Company. The natives of the northern coast are Esquimos, while some tribes of nomadic Indians are thinly scattered over the interior. The Indians of the interior are all tribes of the once great Algonquin race, and could at one time bring 1,000 warriors to repel the incursions of the Eskimos, whom they still bitterly hate. The Eskimos live almost entirely by fishing. They are mild, hospitable, and honest, and well provided with wolf-like dogs, which can draw them over the snow in sledges at the rate of from 6 to 10 miles an hour. See also ESKIMOS.

LABRADOR DUCK—LABYRINTH

Labrador Duck, a rather small handsome sea-duck (*Campylaimus labradorius*), allied to the eiders, of the northeastern American coast; it bred in Labrador, and migrated in winter as far south as Chesapeake Bay, but was never very numerous, and became extinct about 1875, leaving only about 35 specimen-skins in the museums of the world. No very satisfactory theory exists to account for the closure of the species, since the fault does not seem chargeable to excessive shooting or disturbance of breeding-places. The race seemed to be waning, and an epidemic of disease or some weather-disaster destroying many eggs and young, may have been a final blow. The last one seems to have been killed in 1875. Consult: Stejneger, Vol. IV. ('Birds') of 'Standard Natural History' (1885); Lucas, 'Ann. Rept. Smithsonian Inst.' 1888; Dutcher, article in 'The Auk,' January 1894.

Labrador Tea, or Marsh Tea, either of two species of heath of the genus *Ledum* (*L. latifolium* and *L. palustre*). They grow in the northern parts of both Europe and America, and are low shrubs with alternate entire leaves clothed underneath with rusty wool. The fragrant crushed leaves are used by the natives of Labrador as a substitute for tea. They possess narcotic properties, render beer heady, and are used in Russia in the manufacture of leather, yielding an oil known to druggists as ledum oil, rich in tannin and resinous properties. The plant finds a place in medicine as an astringent and tonic.

Labradorite, a plagioclase feldspar of the albite-anorthite series, corresponding chiefly to Ab_nAn₃ (see FELDSPARS). It is, therefore, a silicate of aluminum, calcium, and sodium. It has a hardness of 5 to 6 and a specific gravity of 2.73. It ordinarily occurs in cleavable or granular masses, or as an essential constituent of certain basic eruptive rocks, such as norite, gabbro, diabase, basalt, dolerite or andesite. In these it is associated with some member of the pyroxene or amphibole groups. Labradorite abounds in the Adirondacks, but its type locality is along the coast of Labrador, where it occurs in pure masses of enormous size which exhibit a wonderful change of colors, from dull gray to a gorgeous blue, or more rarely green, copper-red, purple or yellow. It has been used as an ornamental stone, especially in inlaid work.

Lab'ridae, a family of marine fishes, the grasses, representing the highly specialized sub-order *Pharyngognathi* by a large number of beautiful and useful species inhabiting all the warmer seas, and traceable as far back as the Eocene period. These are brilliantly colored fishes usually elongate in form and of large size, with cycloid scales and thick fleshy lips. There are powerful teeth on the margins of the jaws, but none on the palate; while the united lower pharyngeals are much thickened and form a plate beset with rounded, rarely acuminate grinding-teeth. The upper pharyngeals are usually separate, bearing similar teeth. Jordan enumerates 60 genera and 450 species, "chiefly of the tropical seas, living among rocks or kelp." The typical genus *Labrus* is almost wholly European. The principal genera represented in American waters are *Ctenolabrus* (cunners), *Tautoga* (tautogs), *Harpe* (lady-fishes), *Pimelometopon* (fatheads), and *Iridio* (doncellas); and by some authors the parrot-fishes (*Scaridae*) are included.

Consult: Jordan's 'Review' of the family in 'Report U. S. Fish Commission for 1887.'

La Bruyère, Jean de, zhōn dē lä brü-yär, French moralist: b. Paris 17 Aug. 1645; d. Versailles 10 May 1696. He was educated for the law, became treasurer at Caen, and through the influence of Bossuet, was employed in the education of the Duke of Bourbon, grandson of the great Condé, with a pension of 3,000 livres, and was attached to his person during the remainder of his life. In 1688 he published the 'Characters of Theophrastus,' translated into French, to which he added others of his own, in which he represented the manners of his time with great accuracy, and in a style epigrammatical, ingenious, and witty. The work contained 386 "characters"; the 4th edition (1689), 340 additional ones, while the 9th, in press at the time of the author's death, included over 1,100 "characters." Consult: Rahstede, 'La Bruyère und seine Charaktere' (1886); Allaire, 'La Bruyère dans la maison de Condé' (1886); Pellisson, 'La Bruyère' (1893).

Labuan, la-boō-äp', an island of the Malay Archipelago, belonging to Great Britain, situated on the northwest coast of Borneo; about 12 miles in greatest length by 7 miles in greatest breadth; area, 32 square miles. It is mostly low and marshy, and not very fertile, but it is well supplied with water, and has a good harbor at the settlement of Victoria, on its southeast side. Coal of excellent quality is plentiful, and has been mined for many years. The chief town is Victoria. Pop. 5,853, mostly Malays.

Labur'num, Golden-chain, or Bean-tree, a genus of trees and shrubs of the order Leguminosæ. The few species, which are natives of southern Europe and western Asia, are characterized by trifoliate leaves and brilliant yellow blossoms in pendulous many-flowered racemes produced during late spring and early summer. The larger species yield a very hard, heavy, tough, fine-grained, dark green or brown wood, which can be highly polished and is valued for inlaying, cabinet work, turning, etc. The species are also prized for ornamental planting in shrubberies, not only for their flowers, but also for their glossy foliage, which remains green until late in the autumn. No part of the plant is relished by insects, and all parts, but particularly the seeds, are reputed poisonous. Nevertheless, it is said, the young stems are greedily eaten by rabbits, and may thus be made to serve as a sacrificial protection to other shrubbery. The best known species, probably, is the English laburnum (*L. vulgare*), which sometimes attains a height of 40 feet but usually not more than 20 feet. It is hardy nearly as far north as Massachusetts. The Scotch laburnum (*L. alpinum*) is harder, more erect and rigid, bears broader leaves and much longer and slenderer racemes of dark yellow flowers, and continues in blossom about two weeks later than the preceding. By some botanists it is considered only a form or variety of *L. vulgare*. Laburnums thrive in any well-drained soil in either partial shade or full sun. They are readily propagated by seeds generally spring-sown, and also by layers. Choice varieties, of which there are many, are grafted upon seedlings.

Lab'yrinth, a structure having numerous intricate winding passages. The legendary laby-

LABYRINTHODONTA—LACANDONES

rinth of Crete, out of which no one could find his way, but became the prey of the Minotaur, was said to have been constructed by Dædalus. The hint of this legend was probably given by the fact that the rocks of Crete are full of winding caves. The Egyptian labyrinth was a building situated in central Egypt, in the district now called the Fayoum. The building, half above and half below the ground, contained 3,000 rooms. It was probably a place of burial. The labyrinth at Clusium, in Italy, was erected by the Etruscans, according to Varro, for the sepulchre of King Porsenna. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges; the best known is that at Hampton Court, near London.

Labyrinthodon'ta, or **Stegocephali**, a group of primitive four-footed animals, forerunners of modern amphibians and reptiles, whose remains are found fossil in Peruvian, Carboniferous and Triassic strata, and which are the oldest known lung-breathing terrestrial quadrupeds. They were first discovered through finding their footprints imprinted in the Triassic rocks (Keuper beds) of Germany, long before the actual fossilized remains were brought to light. The footprints were described at first as those of a hypothetical form to which the name *Cheirotherium* ("hand beast") was given. As geological science and research progressed, the remains of the labyrinthodonts were discovered, when a comparison of their structure with the footprints showed that some of the latter were made by these creatures; many of the tracks, however, are unidentified. Later, when a great variety of related remains had been discovered, the term *Labyrinthodonta*, which relates to the curious "labyrinthine" infoldings of the enamel-wall of the teeth, was restricted to a single group or suborder (also called *Stereospondylit*) within the general amphibian order *Stegocephalia*. This suborder contains highly developed and mostly large forms, characterized by the complication in tooth-structure above mentioned, and by co-ordinate anatomical distinctions. The principal genera are *Laxomma*, *Trematosaurus*, *Metopias*, *Capitosaurus*, *Mastodontosaurus*, and *Labyrinthodon*, the last including the most recent forms of the Upper Trias, at the close of which period the group appears to have become extinct. See *STEGOCEPHALIA*.

Lac, various products of the lac insect (*Coccus lacca* or *Carteria lacca*), for which see *Coccus*. The insects infect the young branches and twigs of various Asiatic trees, especially figs, and excrete resinous and coloring matters under which they become buried often to the depth of more than a quarter of an inch. They are often so numerous at times of migration that the twigs seem to be concealed by red dust. In northern India and in Assam the production of lac is fostered by hanging infested twigs in non-infested trees, and regular collections are made each autumn and spring, the former being of greater commercial importance, the latter mainly for propagating purposes. Trees in ordinary vigor are considered best, and are said to furnish six or eight crops before being given a rest, though some trees may yield more than twenty crops.

Two methods are commonly employed in preparing lac for market. In the commoner, the twigs are broken or powdered and thrown into

and kneaded in hot water to melt the resin, dissolve the coloring substance and separate the dead insect remains and wood. Several alternate washings and dryings follow in order to have the resin as free as possible from coloring matter. The dried lac is then suspended in coarse cotton sacks before charcoal fires. The bags are twisted to force out the resin, which is caught in films upon pieces of wood upon which it hardens and becomes commercial shellac. The finest quality is a light brown or deep orange. Imperfect removal of the coloring matter results in dark-colored lac. Button lac and plate lac are merely the drops of various sizes which missed the sticks and fell to the ground. The lac that falls to the ground from the trees is collected and sold as seed lac, a name also given to the resin before it is fused but after it has been purified by washing. The first water mentioned above is strained and evaporated, the purple pigment cut in cakes and marketed as lac dye. The other process of purifying the crude lac consists in crushing between rollers, mixing with water, stirring in a cylinder, precipitating the coloring matter with lime, removing the lac, withdrawing the water, pressing the precipitate into cakes and drying them in the sun. The resin, in this process, is melted by steam heat, poured upon tilted, flattened zinc tubes filled with warm water. After cooling it is marketed.

Lacs are prized because of their varnishing properties, because they can be highly polished when dry, and because they are translucent and, in some of the finer grades, transparent, thus allowing the grain of the wood to show clearly through them. They are also used for making the finest grades of sealing wax, vermillion and other colors being added to them after pulling and twisting to make them opaque.

Lac, or **Lak**, from the Sanskrit *lakshā*, or *laksha*, that is, 100,000. In the East Indies it is applied to the computation of money. Thus, a lac of rupees is 100,000. A lac of rupees was equal to about \$46,350. A lac of Sicca rupees was equal to about \$50,000; 100 lacs, or 10,000,000 of rupees, make a *crore*. In 1835 the British government remodeled the currency of India, establishing a more uniform system, and the value of the rupee is now fixed at 32 cents.

Lacaille, *Nicolas Louis de*, né-kō-lâ loo-é dé lä-kâ-é, French mathematician and astronomer: b. Rumigny, France, 15 March 1713; d. Paris 21 March 1762. He was educated for the Church, but soon renounced theology for astronomy. He took an important part in the work of measuring an arc of the meridian, and in 1746 was appointed professor of mathematics in the Collège Mazarin. In 1751 he went to the Cape of Good Hope at the expense of the government, where he determined the position of some 10,000 stars with wonderful accuracy. As his departure from the Cape was delayed, he employed the interval in measuring a degree of the southern hemisphere. His works on geometry, mechanics, astronomy, and optics were numerous. Among them are: '*Leçons d'Astronomie*', and '*Astronomiae Fundamenta*'; '*Cœlum Australē Stelliferum*'; '*Journal historique du Voyage fait au Cap de Bonne Espérance*'.

Lacandones, lä-kān-dō'nës, an Indian tribe living in Guatemala and Mexico. At one time numerous and powerful, they waged war against

LACCADIVE — LACE

the whites. There are now about 1,000 left, of whom a part are friendly to the white people, though retaining their native customs.

Laccadive (läk'ä-div) Isles, a group of small coral islands in the Indian Ocean, about 150 miles off the coast of Malabar. They form 20 separate reefs, containing, however, but 13 islands, only 8 of which are inhabited. The surface soil is naturally so barren that there is little or no spontaneous vegetation on the majority of the islands, and their prosperity must ever depend on the cultivation of the cocoanut. The natives of these islands, a race of Mohammedans called Moplas (of mixed Hindu and Arab descent), are a mild and inoffensive race and dwell in low, thatched, stone-built houses, and live poorly. Vasco de Gama discovered these islands in 1499. They were ceded to the British in 1792. Pop. 6,800.

Laccolith, läk'ō-lith, or Laccolite (Greek, «stone-pit»), a mass of lava or intrusive rock having a mammiform shape supposed to be due to its spreading laterally when forced up from below, the rocks above it being lifted up into dome-like forms. Laccoliths were first described from mountains in Utah.

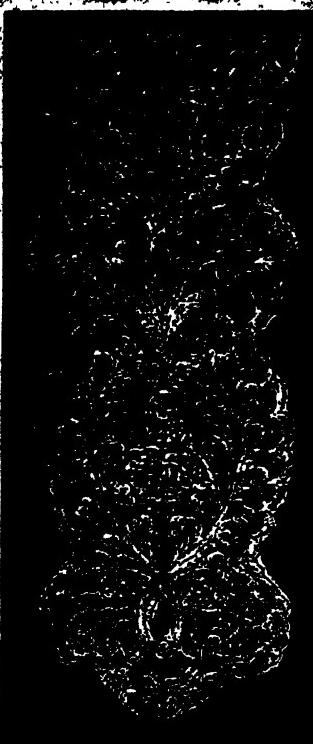
Lace. Authorities differ regarding what constitutes a lace fabric, whether we adhere strictly to the technical distinction of an ornamental open work fabric made with threads by knotting, twisting or stitching, or sewing with a needle, or include fabrics that resemble embroidery, made in combination with something woven. In some statements on the subject prepared for the writer some years ago by the late Dr. Thomas Wilson, one of our highest lace experts, it was set forth that lace is not a textile, because not woven, and that it was not embroidery, its peculiarity, and its principal difference from these being that it is made a mesh or loop at a time, each one being complete in itself, and not made on any previously prepared foundation. There are, however, netted fabrics which would never be called lace although made in the same way, because they do not work out an ornamental design or pattern. All authorities agree that lace is an ornamental fabric, the word ornamental being the one characteristic that distinguishes a lace fabric proper from a fine fishing net, or a Yucatan hammock, in which the threads are netted or twisted precisely as some forms of lace are made, though these articles are not lace. On the other hand, there are fabrics made with threads which have the appearance of lace, embodying in their fabrication artistic, graceful, or ornamental designs, but which are not lace, such as drawn-work, where the design is wrought in a woven fabric by drawing out certain threads forming the fabric, as well as other manipulation.

It is impossible to say when or where lace was first made. We know that the art of weaving is older than any written records, and that flax threads were wrought into fabrics by rude weaving processes in the early Stone age in Europe; and that the art was brought to a high degree of perfection in the later Bronze age. We know that attempts at ornamentation, in the form of more or less elaborate fringes are found in some of the delicate Egyptian linens of 4,000 years ago. The art of embroidering is likewise ancient, for it had reached a high state of perfection before the period of the Pharaohs, and has been prac-

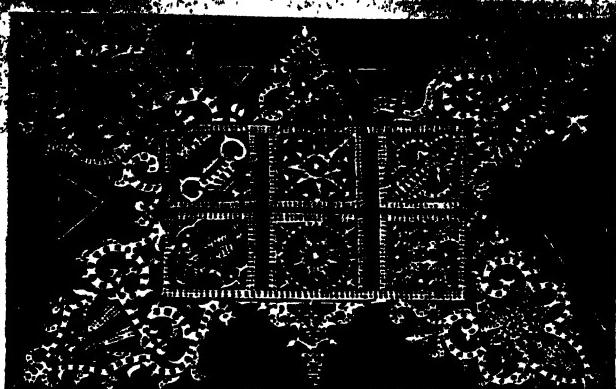
tised by all countries and peoples from time immemorial. The art of lace making, however, must have developed, by a kind of evolution, from early attempts at the ornamentation of fabrics—possibly as early as the 12th century—these first attempts being mere loops of plaited or twisted threads in the form of small cords, attached to the hems of garments. In the earliest productions of lace there was a foundation of woven fabric, such as very fine linen, and the design was wrought by means of needle-point stitches, or darning, something after the manner of embroidery, the uncovered portion of the woven fabric being afterward removed, and a number of such designs skillfully joined together. Thus, from needlework or embroidery, which has come down from Bible times, we may imagine lacemaking was developed. The fabrication of the true laces, according to Dr. Wilson's definition of "a knotted or twisted fabric made one mesh or loop at a time," dating back no farther than the latter part of the 15th century, and it has been said that it is extremely doubtful if any particular specimen can be identified as having been made prior to the middle of the 16th century, at which time lace first appeared as a perfected fabric. The point lace of the earliest period of manufacture came nearer being what might be termed a pure art creation than that which followed in a later period; that is to say, the motive or design having been worked out from a thought in the brain of the maker, and not from a set pattern, as was the case in the fabrication of the later or second period needle-point laces. The earliest work is supposed to have been produced by nuns, and the patterns or motives not only give evidence of high artistic merit, with originality, but the practice of a patience on the part of the worker that would hardly be appreciated in this practical and rapid transit age. The designs from the period which followed were quite as beautiful, but were more set, and show the restrictive influence of copying rather than directly producing original forms as the work progressed.

Italy, France, Belgium, and Germany have all claimed the invention of lace-making, but the country to which the honor belongs is unknown. Dr. Thomas Wilson held it remarkable that lace-making should have sprung up, or been invented at about the same period by two entirely distinct processes without relationship or evolution between them, and that the people of the countries wherein either of the inventions was made were not only unknown to each other, but apparently neither had any knowledge of the process of lace-making invented or employed in the other country. One of these processes is by the employment of the needle and a single thread, wherein the work was perfected mesh by mesh, each mesh being completed as the work progressed. The other process was by the use of many threads at once, each one attached to bobbins for the purpose only of separating them, the meshes being made by twisting the threads a greater or less number of times. When each mesh is only partially completed, the thread is carried on to the next, and so on from side to side the entire width of the fabric. While the countries in which these processes were invented are unknown, the evidence points to Venice as the seat of the former, and to Belgium as the seat of the latter. By these two totally distinct

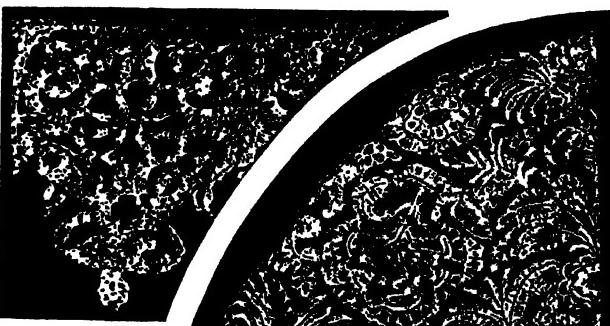
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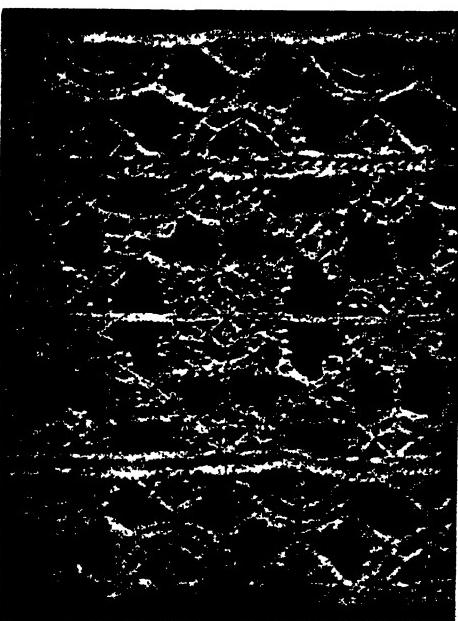
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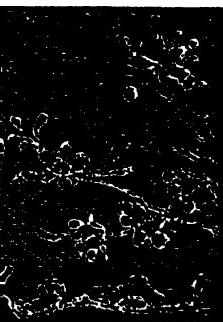
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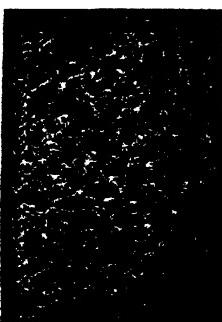
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1. Valenciennes.
2. Venetian chain lace.

3. Italian bobbin lace, 1691.
4. Double point lace.
5. Brussels guipure.

6. Mechlin point.
7. Relief point lace.

LACE

processes fabrics are produced so nearly alike as often to require an expert to distinguish the difference, which, though many times easily determined, yet not infrequently requires the aid of an expert.

It is seen, therefore, that there are two distinct classes of hand-made lace, though many varieties of each:—(1) needle-point lace, and (2) bobbin or pillow lace. Manufactured lace, a third class, is a recent invention, and while it has been the means of bringing a form of ornamental lace fabric within reach of everybody, it can never be compared with the exquisitely delicate and wonderful fabrications of hand-wrought lace, many examples of which are of priceless value.

Lace is chiefly made from linen, cotton and silk threads, usually of the finest numbers, and often specially prepared—some of the finest threads being spun in underground rooms where a damp atmosphere can be maintained, and where the only light is a single beam directed upon the work. Gold and silver threads have also been used, as well as other fibres than those named, such as aloe fibre, or ramie, which is now considerably used in machine-made laces. Mohair and fine wool have also been employed, and even horsehair has been used to stiffen portions of the work in some laces.

Point lace, or fabric made with the needle point, is the oldest known form, its most celebrated examples being the beautiful Venetian designs, and the exquisite French laces of Alençon and Argentan. The early French industry doubtless derived its inspiration directly from Venice, as Colbert, in the time of Louis XIV., is said to have brought from Italy 30 or more of the best lacemakers, and, encouraged by the king, this lace—also known as Point de France—soon became in such vogue that many establishments sprang up in other places in France to supply the demand.

In the oldest designs in point lace there was a foundation of delicate linen, as we have seen; there was also a reticulation of threads attached to a light frame, the patterns being worked over with the button-hole stitch upon these threads and into the linen foundation, which, as the work progressed, was completely hidden by the design. The portions of the foundation outside of the design were cut away, and a number of the design or patterns joined together by means of connecting threads. But sometimes no foundation was employed, the patterns simply wrought upon threads stretched upon the frame as above described, the button-hole stitch being employed. The Venetian point had attained a wonderful perfection by the middle of the 16th century, some of the examples in complexity of stitch, delicacy of design, and artistic merit being masterly conceptions.

Point d'Alençon and Brussels point are still manufactured, the former maintaining many of the distinctive characteristics for which it was so esteemed in the 17th century. Other varieties of needle-point or Guipure laces are Rose point, Portuguese point, and Maltese point. The first-named is especially characterized by the figures being worked in high relief.

Brussels point differs from the Venetian and French needle-point chiefly in the manner of making the stitch, a plain thread being used, and not overcast with the button-hole stitch. In early

times Spanish point enjoyed a wide celebrity, but as much Flemish lace was imported into Spain, there was a decline in the industry, though point laces from the Spanish convents, in the early part of the last century, were very similar in character to the Venetian point. Point d'Espagne is said to have been merely a commercial name used in the 17th century, for which the French manufacturers were responsible. Point d'Angleterre owes its name to an effort on the part of the Flemish lace-makers to evade the restrictive measures which were adopted by Great Britain in the latter part of the 15th century, to encourage the home lace industry. The prohibition worked effectively, smuggling was difficult, and in time Flemish lace-makers were induced to settle in England, whereby some of the characteristics of Flemish laces have been perpetuated in the English pillow laces.

It has been claimed that pillow lace manufacture was the invention of Barbara Uttman, of St. Annaberg, Saxony, about 1561, though some authorities assert that she only introduced the manufacture, probably from Flanders. At any rate, paintings from an earlier period give evidence that lace was manufactured in Flanders at least half a century before her time. Pillow lace is made by working the design over a parchment pattern upon a pillow or cushion, the threads being wound upon bobbins. The method was to attach the pattern to the pillow, pins being inserted at regular intervals following closely the lines of the pattern or design. The figure is then wrought by twisting the threads around the pins to form the netted or open-work effect, which characterizes this form of lace. The Flemish laces of the 16th century became quite as famous as the Italian, and the art, as practised in Flanders, was early introduced into many countries of Northern Europe. Among the more important laces that are made with the pillow and bobbins, may be mentioned Brussels (both Saxony and Flemish), Mechlin, Lille, Chantilly, Valenciennes, Honiton, Buckinghamshire, and Limerick or Irish lace.

The Mechlin laces—sometimes called the queen of laces, and which formerly enjoyed a wide celebrity—are products of Mechlin, Antwerp, and Lierre. Ordinary Mechlin is made with a hexagonal mesh, as is also Brussels pillow. The Lille laces embody a simple pattern, marked by a thick thread, and are said to be "the finest, lightest, most transparent, and best made of all grounds." The Chantilly silk laces were also very simple in character, particularly in regard to their meshed grounds. The black laces were especially noted, and at one time were in high favor. Valenciennes is probably the most important pillow lace now manufactured in Belgium, the cities of Courtrai, Bruges, Ypres, Ghent, and Alost furnishing the larger part of the supply. That made at Ypres especially is the finest quality. Its predominant characteristics are richness of design, beauty of ground, and evenness of tissue. In this lace the mesh is diamond shaped and closely plaited, without twisted sides to the mesh.

The English laces are chiefly made in the counties of Buckinghamshire, Devonshire, and Bradford. Honiton is the best known of the pillow laces of Great Britain, and the most beautiful. It embodies original characteristics that give it an individuality, although it bears some

LACE BARK — LACÉPÈDE

resemblance to Brussels. British point is an imitation of Honiton. Patronized by the late Queen and by other members of the royal family, Honiton soon became popular and its manufacture for many years has been important. Buckinghamshire is said to be an adaptation of the Mechlin, and the patterns to have been used since the 18th century. Laces are made in other places in England, and in Scotland, for the most part as household industries. As has been said, the Irish lace is made at Limerick; it is justly popular, and holds a high position. The lace industry of Russia is said to have been promoted through court patronage after the visit of Peter the Great to Paris. These laces are especially noted for the uniformity of their designs, or patterns.

We have been considering chiefly lace-making in Europe. In more modern times the art has been introduced into many countries, the European nations especially extending the manufacture into their colonies, the natives being the lace-makers. Even the natives of some of the South American countries practise the art, which was taught them by the missionaries of an earlier period, and which, handed down from generation to generation, has become identified with the people. The peasant women of Fayal have for many years produced an exquisite lace, with designs in high relief, the fibre used being finely prepared filaments of the *Agave Americana*, or "Aloe fibre" as it is known. This lace was formerly sold in Paris at very high prices; and it was claimed a few years ago that there were only 25 women on the island who were skilled in its manufacture. Among the beautiful peasant laces should be mentioned those of Russia, Germany, and Crete, though the Cretan lace manufacture has not survived. Malta produces a pillow lace in white and red threads which is noted, and pillow lace is made in Ceylon which somewhat resembles both the Malta and the Buckinghamshire. The natives of Madagascar, under French tuition, make a fabric resembling antique lace, which is an article of export. Wm. E. Curtis is authority for the statement that the women of Paraguay make a very fine pillow lace which is called Nanduty (Nanduti), the art having been taught them by the Spanish nuns. A native fibre is used which is described as soft and lustrous as silk. The designs are beautiful and the fabric indestructible. The lace is made in small squares and these joined together. In Dr. Thomas Wilson's valuable collection there are also some fine examples of aloe fibre lace from Corfu and Zante.

The third class of lace manufactured is that produced by machinery, the chief centres of the machine lace industries being Nottingham, England, and Calais, France. Nearly every kind of lace can be made by machinery, and the manufacture has been brought to so high a state of perfection, that some of the lace is difficult to distinguish from the fabrics produced by hand processes. While the enormous output and cheapness of machine lace has placed the fabric within reach of all classes, it is claimed that the demand for hand-made lace has not diminished, though prices have been affected.

It would be a hopeless task to endeavor to describe the complicated machines in use today, to make them understood, in so brief an account as appears in this place, and the

student is therefore directed to the 'History of Machine Wrought Lace,' by Mrs. Bury Palliser, London, 1865-9, and to the 'History of Machine Wrought Hosiery and Lace Manufacture,' W. Felkin, 1867. The first attempt at the invention of a lace machine dates back to 1758 when a stocking weaver was able to produce upon a machine a lace in imitation of Brussels. The really practical machine, however, did not appear until 1809, the invention of Heathcote, which is said to have been suggested from machinery employed in the manufacture of fishing nets. A year or two later there were improvements by several inventors, Morley, Leaver, Clark, and others, which with subsequent improvements, have brought the lace machinery of to-day to such perfection. Machine lace is largely made from cotton, though the new fibre ramie has been employed to some extent, and with best results. This textile is very strong, with the lustre of silk, and takes color well. Some machine-made black ramie lace, a fourth of a yard wide, in the writer's collection of textiles, is an exquisite fabric.

Gold and silver lace, strictly speaking, is not a lace fabric, but rather a woven fabrication resembling in the finished state some kinds of embroidery. It is either made from fine filaments of gold and silver (threads), or from textile yarns or threads wound or otherwise covered with the metal.

CHARLES RICHARDS DODGE,
Commercial Fibre Expert, Washington, D. C.

Lace Bark, is derived from the inner bark of several species of trees, and is readily detached in sheets or layers like birch bark, each layer being a delicate network of fibre, which when gently stretched a pentagonal or hexagonal mesh is formed which resembles lace. The most commonly known species is the lace bark of Jamaica, *Lagetta linearia*. It is said that Charles II. was presented by the governor of Jamaica with a cravat, frill, and pair of ruffles made from this substance. The fibre can also be twisted into strong ropes, and in past time thongs and whips were made from it, with which the negroes were beaten. The lace bark tree of New Zealand is an Australian species, *Plagianthus betulinus*, more commonly known as the ribbon tree; its layers of bark showing the same beautiful lace-like texture as the Jamaica form. Another species producing a delicate, white lace-like tissue is the Birabira of South America *Daphnopsis tenuifolia*.

Lacedæmon, läs-e-dē'mōn. See SPARTA.

Lacépède, Bernard Germain Etienne de la Ville, bär-när zhär-män à-tē-én dé là vél lä-sä-päd, COUNT DE, French naturalist: b. Agen, France, 26 Dec. 1756; d. Epinay, France, 6 Oct. 1825. He abandoned the military profession, for which he was destined, and devoted himself to the study of natural history. His teachers and friends, Buffon and Daubenton, procured him the important situation of keeper of the collections belonging to the department of natural history in the Jardin des Plantes. In 1791 he was elected member of the legislative assembly, and belonged to the moderate party. Napoleon made Lacépède a member of the conservative senate, and conferred on him the dignity of grand-chancellor of the Legion of Honor. After the restoration he was made peer of France. He continued Buffon's 'Historie natu-

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relle' with the titles 'Histoire des quadrupèdes ovipares et des serpents' (1788-9) and 'Histoire naturelle des reptiles' (1789), and published also 'Histoire naturelle des poissons' (1798-1803); 'Histoire des cétées' (1804); etc.

Lacertilia, lăs-ér-til'i-a, or **Autosauri**, the order of saurian reptiles which contains the lizards. These are distinguished from the serpents (*Ophidia*) to which they are most nearly allied by the fact that the right and left halves of the mandibles (lower jaws) are connected by a sutural symphysis, whereas those of serpents are connected by a more or less distensible cartilage. The great majority possess well-developed limbs, movable eyelids and cutaneous scales, covered by a horny epidermis, usually thin, but sometimes thick and rising into pointed projections. In a few degraded and burrowing forms the limbs have been greatly reduced, or one pair or even both pairs completely lost, while the eyes may have become buried beneath the skin and the scales nearly or wholly obsolete. The vertebræ are procoelous, except in some of the geckos, where they are amphicoelous; the ribs of the trunk articulate by their capitular heads only, the reduced tubercula being attached to the vertebræ by ligaments. The limbs are typically formed after the pentadactyl pattern; and the shoulder girdle and sternum are complete. The hyoid apparatus resembles that of birds. In the skull the quadrate bone is movable except in a few degraded forms. The skin is covered with scales formed within it, and the epidermis is horny, and is periodically shed in flakes; but in many cases these scales do not overlap and look like scales, but are represented by bony granules, giving a "pebbly" aspect to the surface; or these osteoderms (which never occur in snakes) may form in the ordinary scales. The skin contains no glands; but in many lizards abounds in chromatophores (q.v.) controlled by muscles whose action causes the variations in surface color of which many lizards are capable, and of which they avail themselves as an aid in hiding from their enemies. The group possesses strong power of regenerating lost parts and especially of renewing the tail, which in many families breaks off under a very slight strain.

The *Lacertilia* are a comparative development of the reptilian race, not traceable beyond the beginning of the Tertiary. Fragmentary remains of several existing families occur in the Eocene and Miocene rocks; and the Pleistocene river-deposits of Queensland, among which was a monitor-lizard 30 feet long. The line probably originated in the *Prosauria* (q.v.), represented by a single living form,—the tuatara (q.v.). Lizards are now scattered over all the warmer parts of the world, and seem to be increasing and developing. They are said by Hoffman to include 434 genera and 1,925 species.

The *Lacertilia* are divided into three sub-orders: (1) *Geckones*, equivalent to the family *Geckonidae*; (2) *Lacertæ*, typical lizards, including the families *Agaenidae*, *Iguanidae*, *Zonuridae*, *Anguidæ*, *Helodermatidae*, *Varanidae*, *Tejidae*, *Lacertidae*, *Scincoidæ* and others of minor importance; (3) *Chameleontes*, with a single family.

For more particular descriptions see CHAMELEON; GECKO; LIZARD; and the names of various lizards, as AGAMA; GILA MONSTER; etc.

Lace'wing, a neuropterous insect of the families *Hemerobiidae* and *Chrysopidae*. About 40 species are found in the United States, the most common perhaps being the golden-eyed flies of the genus *Chrysopa*. These are greenish, ill-smelling, gauzy-winged creatures usually less than two inches long and feeding little or not at all in the adult state. The females lay their eggs upon the summits of silky threads, by which means they are protected from predaceous enemies. The larvæ, as soon as hatched, crawl down the threads and feed upon the first soft-bodied insect they reach—perhaps a brother. They are considered useful in destroying plant-lice, hence the name "aphis-lions" (q.v.), but in California they attack the larvæ of the useful ladybirds. In Europe gardeners search for them, and place them upon trees affected with plant-lice. They spin a tough silken cocoon from which they emerge through a circular lid.

Lachaise, François d'Aix de, frān-swā dā dé la-shāz, French Jesuit confessor of Louis XIV.: b. Château d'Aix 25 Aug. 1624; d. Paris 20 Jan. 1709. He was the provincial of his order when Louis, on the death of his former confessor, appointed Lachaise to that office. The new confessor with admirable tact kept himself clear of the innumerable meshes of court intrigue. Jansenism was at the time a powerful factor in ecclesiastical and political circles, and the Jesuits were its most formidable adversaries, but Lachaise knew how to conduct himself under all circumstances with address, coolness, and sagacity; and never allowed himself to be drawn into violent measures against his opponents. That Louis XIV. married Mme. de Maintenon was owing principally to the counsels of his Jesuit confessor. Lachaise retained the favor of his monarch till his death, and Louis had a country-house built for him to the west of Paris, on an eminence which had received the name of Mount-Louis. Its extensive garden now forms the cemetery of Père Lachaise, the largest in Paris.

La Chaussée, Pierre Claude Nivelle de, pē-är klōd né-vēl de lä shō-sā, French dramatist, founder of the so-called "pathetic comedy" or melodrama: b. Paris 1692; d. there 14 March 1754. 'Le Préjugé à la Mode' (1735) by him, was the first French pathetic comedy. Of 18 dramas by him, among the best are: 'School of Friendship' (1737); 'Melanie' (1741); 'Love for Love' (1742); 'Pamela' (1743); 'School of Mothers' (1745); 'The Governess' (1747). His plays were all written in verse and followed strictly the rules of the classic drama.

Lachesis, lăk'-ē-sīs, in classical mythology, one of the three FATES (q.v.).

Lachine, lä-shēn', Canada, town in Jacques Cartier County, Province of Quebec, Canada; on Lake Saint Louis, and on the Grand Trunk railroad; 8 miles from Montreal. It is a popular resort for pleasure parties in the winter, and in summer is largely used as a residential place for business men of Montreal. It is best known as the terminus of a canal 9 miles long connecting it with Montreal and built to avoid the Lachine Rapids. All the commerce of Montreal by the Great Lakes passes through this canal. Lachine is also the terminus of the Ottawa line of steamers, and daily at noon in summer a steamer of the Royal

LACHLAN — LACORDAIRE

Mail line leaves the town for Toronto, Hamilton, and Kingston. Here are the electric works of the Lachine Power Company (1894-7) with a plant of 21,000 horse-power, designed to furnish power and light for the city of Montreal. The name Lachine was given to the site in 1669. The Indians burned the town and massacred all the inhabitants in 1689. Pop. (1891) 3,761; (1900) 5,561.

Lachlan, läk'län, a river of East Australia, rising in New South Wales, to the west of the Blue Mountains. It is formed by the union of several streams. The river makes a semicircular sweep north of about 240 miles, when, pursuing a generally southwest course, it is joined by the Murrumbidgee; the united stream afterward falling into the Murray at lat. 34° 35' S.; lon. 143° 10' E. The total course is about 700 miles.

Lachrymal (lak'rī-māl) **Organs**. See EYE.

Lach'rymatory, a term applied to small glass vessels, in shape like the alabastron, but with a longer neck, and said to be intended for holding tears consecrated to the dead. Their real use was probably to hold perfumes or ointments.

Lachute, lä-shoot', Canada, town in Argentine County, Province of Quebec, on the Ottawa River; 44 miles from Montreal. It is an important shipping centre for farm and dairy products and has large paper mills, pulp mills, and wood-working industries. Pop. (1901) 2,024.

Lacinaria, lä-sin-ä'-ri-a. See LIATRIS.

Lackawanna (lak-a-wōn'a) **River**, a considerable stream which runs through the northeast part of Pennsylvania and flows into the Susquehanna at Pittston; length about 50 miles. Great quantities of the best anthracite coal are mined in the valleys adjacent to this river. This coal field, being the nearest to New York, supplies a large portion of the anthracite consumed in that city and further east. The greatest thickness of strata belonging to the coal measures amounts in the central portion of the basin to nearly 1,800 feet. On each side they dip toward the central axis at angles sometimes exceeding 30°, gradually lessening till they are found in horizontal and undulating positions near the centre. Toward each extremity of the basin they gradually shelf upward till replaced by the outcrop of the older rocks. The basin is remarkable for the large number of beds concentrated in a moderate thickness of coal measures. Thus at Solomon's Gap as many as 13 beds, varying from 1 foot to 19 feet in thickness, are found in 900 or 1,000 feet of strata, making a total thickness of coal of about 84 feet, or of workable beds 45 or 50 feet.

Lacmus. See LITMUS.

Lacon, lä'kōn, Ill., town and county-seat of Marshall County, on the Illinois River, and on the Chicago & Alton railroad, 35 miles north of Peoria and 128 miles southwest of Chicago. Steamboats ascend the river as far as this point and there are a number of grain elevators and other shipping facilities here; manufactures of wagons, carriages, and woolen goods; a national bank, several newspapers and numerous churches. Pop. (1890) 1,649; (1900) 1,601.

La Condamine, Charles Marie, shär'l mā-rē lä-kōn-dā-mēn, French scientist: b. Paris 28 Jan. 1701; d. there 4 Feb. 1774. He entered the military profession, but soon renounced this career, and devoted himself to the sciences. In 1736 he was chosen, with Godin and Bouguer, to determine the figure of the earth, by measurements to be made in the equatorial regions of South America, and remained abroad for eight years. In 1748 he was elected a fellow of the Royal Society of London, and in 1760 a member of the Academy of Sciences of Paris. His principal works are his account of his travels (1745), his work on the figures of the earth (1749), and that on the measurement of three degrees of the meridian in the equatorial regions.

Laconia, lä-kō-nī-ä, formerly the name for a large tract of land granted by royal patent to Ferdinand Gorges and John Mason. It was located between the Merrimac and Kennebec rivers, the ocean, and the Saint Lawrence River of Canada. The present State of New Hampshire formed a considerable portion of Laconia.

Laconia, a territory in ancient Greece. See SPARTA.

Laconia, N. H., city, county-seat of Belknap County; on the Winnipesaukee River, and on two divisions of the Boston & Maine railroad; about 28 miles north of Concord, the capital of the State, and 100 miles north of Boston. It was settled in 1780-2 by English people from the southern part of New Hampshire. It was incorporated as a town in 1852 and chartered as a city in 1893. It is in an agricultural and manufacturing section, in a beautiful lake region. Its charming scenery, cool climate and opportunities for fishing make it a favorite summer resort. Its principal manufactures are hosiery, railroad cars, machinery, lumber, and paper boxes. The hosiery mills employ about 1,200 operatives; and the car shops employ about 600 men. The State Home for Feeble-Minded Children is located here, also the State Fish Hatchery. The educational institutions of the city are the public and parish schools and the Gale Memorial library. The prominent buildings are 12 churches, an opera house, and the court-house. The three national banks have a combined capital of \$200,000. The government is vested in a mayor and 14 councilmen. Pop. (1890) 6,143; (1900) 8,042.

C. N. VAUGHAN,
Editor of 'Democrat.'

Lacordaire, Jean Baptiste Henri Dominique, French preacher: b. Recy-sur-Ourse 12 May 1802; d. Sorèze 22 Nov. 1861. After studying law in Paris he began practice in that city. He was in religion a deist of the Voltairean school, and it was only after reading the 'Essai sur l'Indifference' of Lamennais (q.v.) that he came to the conclusion that Roman Catholicism was a primal factor in the development of political life. It was with this view that he determined to become a priest. Entering the Seminary of Saint Sulpice in 1824 he was ordained priest in 1827. In 1835, he was appointed preacher at Notre Dame, and always collected an audience that filled the building. He was, however, bent on a wider project, the revival of the Dominican order, the great order of preachers in France. With this view he revisited Rome in 1838, and after the usual novitiate became a Dominican. The Dominican

LA COSA — LACQUERING

is originally a Spanish order, and was never popular in France, and Lacordaire had little success in establishing it there. He was in 1848 elected a member of the National Assembly. He was, however, rebuked by his bishop for calling himself a republican and retired from politics, in 1852. His honest indignation against the *coup d'état* expressed in a sermon roused the animosity of Napoleon III., and he was driven from the pulpit, and became director of the Lycée at Soreze. Consult: Lives by Montalembert (1862); Foisset, 2d ed. (1874); Chocarne (8th ed. 1894); Greenwell (1877); Lear (1882); D'Haussonville (1895); Nicolas, 'Le Père Lacordaire et le Libéralisme' (1880); Fesch, 'Lacordaire, Journaliste' (1897).

La Cosa, Juan de, Spanish navigator: b. about 1460; d. November 1509. He was the companion of Columbus in the discoverer's voyage to Hispaniola in 1493 and settling at Santoña, in Aranham, made his living and reputation as a draughtsman of charts (1496). He accompanied Ojeda in an expedition to the Pearl coast in 1499; and in 1501 explored the northern coast of South America from Venezuela to Panama. In the course of an expedition on which he accompanied Ojeda, the party on landing in the bay of Cartagena was attacked by Indians, and he perished with his companions, of whom Ojeda alone escaped. His map of the New World, beautifully illustrated on vellum, is in possession of the Spanish government, and is the earliest known, having been made in 1500.

Lacoste, la-köst, Sir Alexander, Canadian jurist: b. Boucherville, Quebec, 12 Jan. 1842. He was educated at the College St. Hyacinthe and at Laval University and was called to the bar in 1863. He began practising his profession in Montreal and after a brilliant legal career was appointed Queen's Counsel in 1880. He sat in the Legislative Council of Quebec 1882-4, became a Dominion senator in 1884, and in 1891 chief-justice of Quebec. He was knighted in 1892.

Lacquering, läk'er-ing, the art of polishing or veneering with various preparations of lac (q.v.). It is used in many ways. In Tonking where the abundant production is the object of an important trade with the Chinese, it is so used only for varnishing, while in China the same product from the same sources contributes to most artistic applications. When the Annamites propose to lacquer an object, a box, for example, they first stop up the holes and crevices, covering all the imperfections with a coating of diluted lac by means of a flat, close short brush. Then they cover the whole with a thick coating of lac and white clay. This clay, oily to the touch, is found at the bottom of certain lakes in Tonking; it is dried, pulverized and sifted with a piece of fine silk before being embodied with the lac. This operation is designed to conceal the inequalities of the wood and produce a uniform surface, which, when completely dry, is rendered smooth with pumice stone. If the object has portions cut or sunk the clayey mixture is not applied, for it would make the details clammy, but in its place a single, uniform layer of pure lac. In any case, after the pumicing, a third coating, now pure lac, is passed over the piece which at this time has a mouse-gray color. This layer, known

under the name of *sou lot*, colors the piece a brilliant black. As the lac possesses the remarkable property of not drying in dry air, the object is left in a damp place. When perfectly dried the piece is varnished and the desired color imparted by a single operation. If the metallic applications are excepted, the lac is colored only black, brown, or red.

The following formulas are in use:

Black.—One part of turpentine is warmed for 20 minutes beyond the fusing point; then poured into three parts of lac; at the same time *phœn deu* (copperas) is added. The mixture is stirred for at least a day, sometimes more, by means of the *caï way*, a large paddle.

Maroon.—This is prepared by a process similar to the preceding, replacing half of the copperas by an equal quantity of China vermillion.

Red.—The lac, previously stirred for six hours, is mixed with hot oil of *trau*, and the whole is stirred for a day, after which vermillion is added. The latter should be of good quality, so as to have it brilliant and unchangeable.

The operation of lacquering is then ended, but there are parts to be gilded. These are again covered with a mixture of lac and of oil of *trau*. When this layer is dry the metallic leaves are applied, which are themselves protected by a coating composed also of lac and oil of *trau*. All these lac and oil of *trau* mixtures are carefully filtered, which the natives effect by pressing the liquid on a double filtering surface formed of wadding and of a tissue on which it rests. It can only be applied after several months when the metallic leaf is of gold. In the case of silver or tin the protecting coat can be laid on in a few days.

The wood to be lacquered should be absolutely dry. In Japan when wood is well prepared and the faults have been corrected with pure lac it is dried, pumiced and covered with a coat composed of crushed flax mixed with glue. Then a layer of lac is applied and covered with a fine linen fabric which should perfectly adhere in all its parts. This first preparation, suitably dried, serves as a foundation for the successive applications of 33 layers. Each coating is rubbed with a fine-grained stone before drying in the moist chamber. This is done with the greatest precaution, so as to avoid impurities and dust. The last polish is obtained by rubbing with the powder of calcined deer horn. The piece is then ready to receive the application of gold or of silver, which is effected as follows: The design to be reproduced is drawn on very fine paper prepared with a mixture of glue and alum, and on the back of the paper the outlines are traced with a brush of fine rat's hair, dipped in lac previously boiled over a brisk charcoal fire. This paper is then applied to the object to be decorated, and it is made to adhere by rubbing with a spatula, either of minoki wood or of whalebone. When the paper is removed the design is found transferred damp and is rendered more distinct by the application of a white powder by means of a piece of wadding. With one of these transfer papers 20 reproductions can be secured, and the lines can be retraced with the boiled lac, it is said, so as to procure copies almost indefinitely. The outlines remain damp in consequence of the use of the boiled lac, and imperfections can be corrected. In this case the outlines are retraced with a pencil of

LA CROSSE—LACTIC ACID

hare's hair lightly charged with a preparation of lac not boiled. This operation is delicate and requires great care not to displace the lac from the original outlines. When ended the whole is covered with fine gold, silver, or tin powder, as desired; the powder is applied by means of a piece of wadding. If the object to be decorated is of large dimensions the process is conducted on separate parts, and at each step the piece is placed in a damp closet tightly closed, so as to exclude the dust. When the metallic coating has hardened sufficiently the piece is taken out, and the design is covered with a fine transparent lac laid on with a brush of hare's hair. The gilding or silvering of the succeeding part is never attempted until the preceding has been completely dried in the damp chamber. All the parts of the object are finally rubbed with a piece of camelia wood charcoal in order to equalize the thickness, and then polished with the fingers moistened with a mixture of calcined deer horn powder and oil.

La Crosse, Wis., city and county-seat of La Crosse County, on the Mississippi River and the Chicago, M. & St. P., the Chicago & N. W., and several other railroads; 200 miles northwest of Milwaukee, and 130 miles south of Saint Paul.

Industries, etc.—La Crosse is the centre of the farming, manufacturing and dairying trade of western Wisconsin, southern Minnesota and northern Iowa. There are manufactories of boots and shoes, sash, doors and blinds, plows, agricultural implements, boilers and heavy machinery, extensive carriage works, rubber mills, cracker and knitting factories, etc., large flour mills, pearl button factories, steel and corrugated roofing works, woolen mills, a large tannery, mammoth cooperages, five large breweries, affording a market for 150,000 bushels of barley and 100,000 pounds of hops per annum; extensive cigar manufactories and various other industries. The city has five banks with a combined capital of \$1,102,700 and doing an annual business of \$180,000,000.

Educational Buildings, Public Institutions, etc.—La Crosse has a public library, the Washburn, containing 25,000 volumes, two business colleges, a high school, public school buildings and several Catholic and Lutheran parish schools. The city has a fine city hall, a convent, asylum for chronic insane, Saint Francis and United States Marine hospitals, opera houses, etc.

History and Government.—La Crosse was first permanently settled in 1841 by Nathan Myrick, John M. Levy and others. It became a village in 1851 and was incorporated a city in 1856. Under a revised charter of 1891 the government is administered by a mayor, elected every two years, and a council of 20 aldermen, one-half elected biennially. The council appoints the minor officials. The city owns and operates the waterworks, and has electric light and street railroad plants. Pop. (1903) 30,038.

ROBERT CALVERT,
Secretary Board of Trade.

La Crosse, a Canadian out-door game played with a ball and a stick of light hickory,

bent at the top like a bishop's crozier. The stick is 5 or 6 feet in length. Strings of deer-skin are stretched diagonally across the hooked portion of the crosse, forming a network. Only one ball is employed, made of india-rubber, and eight or nine inches in circumference. Posts or poles about six feet high, with a small flag at the top of each, complete the equipment. The players are usually 12 on each side, but their number as well as the distance of the goals apart, is nearly optional. The object of the game is for one side to drive the ball through their opponents' goal. The ball must not be touched with the hand or foot, but is scooped up from the ground with the bent end of the crosse, on which it is carried horizontally, while the player runs toward one of the goals, trying to dodge his antagonists. If it seems prudent, he pitches the ball off his crosse toward one of his own side who may be in a better position to carry it toward the goal. The players must not strike, trip up, or grasp one another, nor must anyone lay hold of the crosse of another; a player may strike the ball off an opponent's crosse with his own crosse, and not by any other means. The National La Crosse Association of Canada was organized in 1867, and since then Canadian teams have played in England and Scotland. It is played occasionally in the United States, but is not popular.

Lactarene, lāk'tā-rēn, the casein of milk as commercially prepared by being freed from fat, precipitated by an acid, thoroughly purified, dried, and powdered. It is insoluble in water, but is soluble in an alkali, such as ammonia, and in this form is used, like albumen, for fixing pigment colors in calico-printing. The cloth, after it has been printed, is steamed, the ammonia is driven off, and the pigment is thereafter able to resist the action of water.

Lactation. See MILK, HUMAN.

Lacteals, lāk'tē-älz, vessels which, together with the lymphatics, constitute one system for conveying a fluid or fluids from various organs of the body to the veins near their terminations in the heart. The fluid which the lacteals convey is milky after a full meal, and is called chyle, though during intervals of fasting it is a yellowish lymph, as in the lymphatics. The lacteal vessels commence on the intestinal villi, unite with one another in the mesentery and, after leaving the mesenteric glands, discharge their contents for the nourishment of the body into the receptaculum chyli, in front of the second lumbar vertebra. See also LYMPH; LYMPHATIC GLANDS.

Lac'tic Acid ($C_3H_6O_3$). Scheele, in 1780, was the first to describe the acid present in sour milk. In 1832 Liebig and Mitscherlich showed it to be a distinct acid. Lactic acid is widely distributed; there are many modes of preparing it artificially; and its isomeric varieties, of which four have been described, have excited much attention. Its two principal kinds are fermentation lactic acid and paralactic or sarcolactic acid. The former is got from concentrated sour whey by removing the curd, adding lime, filtering, diluting with water, removing the lime with oxalic acid, evaporating, and extracting the lactic acid with alcohol. It is more usual, however, to get it by what is called the lactic fermentation, from sugar or saccharine

LACTIC FERMENT—LADD

substances. The sugar is dissolved in water; to the solution is added decaying cheese and a quantity of fine, well-washed prepared chalk, and the mixture is kept for some weeks at between 86° and 95° F. Fermentation begins, and much lactic acid is formed, which combines with the chalk, and forms lactate of calcium. This salt is then decomposed by sulphuric acid, filtered, and the fluid is boiled with carbonate of zinc. Lactate of zinc is formed, which is collected and decomposed by sulphuretted hydrogen. The fluid filtered from the sulphide of zinc is evaporated, and the syrupy fluid which remains contains the lactic acid. Lactic acid is a syrup (specific gravity, 1.215) which remains liquid even at very low temperatures. It deliquesces in moist air, dissolves in all proportions in alcohol and water; has no odor, and has a purely sour taste. It cannot be distilled, or even heated, without undergoing decomposition, lactic anhydrides being formed; at a higher temperature carbonic oxide is evolved, and a variety of products distil over, and charcoal is left in the retort. By oxidizing agents, such as bleaching-powder and nitric acid, it is converted into oxalic acid; by oxide of manganese into aldehyde.

The paralactic or sarcolactic acid was observed in flesh by Berzelius in 1806, and he considered it the same as that derived from milk. Liebig showed that they were not absolutely identical, but the nature of their differences is at present unknown. This acid is readily got from the cold aqueous extract of flesh by adding a solution of baryta, coagulating and removing albumen, concentrating the solution, precipitating the baryta, filtering, and evaporating. The syrupy residue contains the acid. The calcium salt of the fermentation acid contains more water of crystallization; when heated it retains it for a shorter time; and it is more soluble than the sarcolactate. Again, the zymolactate of zinc contains more water, loses it more quickly on heating, but itself endures a much higher temperature without decomposition than the sarcolactate. The zymolactate is much less soluble in water and in alcohol than the other; the crystalline forms of the two salts also are different. The other salts of lactic acid are for the most part crystalline, and soluble in water. Lactic acid forms compound ethers and substitution acids.

Lactic Ferment, a minute organism which, under the microscope, is seen to consist of small elliptical cells, generally detached, but sometimes occurring in chains of two or three. It is developed in milk when it is allowed to stand for some time, and is the cause of the milk becoming sour, the sugar of the milk changing into lactic acid. It is also developed when cheese is added to a solution of sugar, and kept at a temperature of 35° to 40°. See also **FERMENTATION**.

Lactom'eter, or Galactometer, an instrument for ascertaining the different qualities of milk. Several instruments of this sort have been invented. One consists of a glass tube 1 foot long, graduated into 100 parts. New milk is filled into it and allowed to stand until the cream has fully separated, when its relative quantity is shown by the number of parts in the 100 which it occupies.

Lac'tose, sugar of milk ($C_{12}H_{22}O_{11}$), a substance obtained by evaporating whey, filtering

through animal charcoal, and crystallizing. It forms hard, white, semi-transparent trimetric crystals, which have a slightly sweet taste, and grate between the teeth. It is convertible like starch into glucose by boiling with very dilute sulphuric acid.

Lactuca'rium, the brown viscid juice of the common garden lettuce, obtained by incision from the leaves and flowering stems, and dried in the air. It is a mixture of various substances, including lactucone, lactucin, lactucic acid, mannite, albumin, etc. Lactucarium is hypnotic, anti-spasmodic, and sedative, and has been recommended in cases in which opium is inadmissible, particularly for children. It has been administered with advantage in chronic rheumatism, diarrhoea, and asthma, in doses of two to five grains.

Ladd, George Trumbull, American educator: b. Painesville, Lake County, Ohio, 19 Jan. 1842. In 1864 he was graduated from Western Reserve College, and after spending the next two years in business, entered Andover Theological Seminary, where he was graduated in 1869. In 1869-71 he preached in Edinburg, Ohio; and was pastor of Spring Street Congregational Church, Milwaukee, Wis., 1871-9. He was called to the chair of philosophy at Bowdoin College in 1879 and held that position until he became professor of philosophy at Yale College in 1881. After the death of President Porter he was made Clarke professor of metaphysics and moral philosophy, which position he still holds. Professor Ladd's career as a student and educator has been one of great activity and success. While still a student at Andover he prepared and published two important articles on the origin of the Synoptic Gospels in the 'Bibliotheca Sacra.' His published works include: 'Principles of Church Polity' (1882); 'Doctrine of Sacred Scripture' (1884); 'Lotze's Outlines of Philosophy' (translation, 5 vols. 1887); 'Elements of Physiological Psychology' (1887); 'What is the Bible?' (1888); 'Introduction to Philosophy' (1889); 'Outlines of Physiological Psychology' (1890); 'Philosophy of Mind' (1891); 'Primer of Psychology' (1894); 'Psychology Descriptive and Explanatory' (1894); 'Philosophy of Knowledge' (1897); 'Outlines of Descriptive Psychology' (1898); 'Essays on the Higher Education' (1899); 'A Theory of Reality' (1899); 'Lectures to Teachers on Educational Psychology' (in Japanese); 'Philosophy of Conduct' (1902). Besides his work as an author he has achieved remarkable distinction as a lecturer. During the academic year of 1895-6 he was chosen a member, for the year, of the Faculty of Harvard University and conducted a graduate seminary in ethics. Twice he has been invited by the Imperial Educational Society of Japan to deliver courses of lectures. In the summer of 1892 and again in 1899 he visited and lectured at Doshisha, Kyoto, Tokyo, Hakone, and Kobe. For his distinguished services to the cause of education he was admitted into audience with the emperor of Japan and by him decorated with the third degree of the order of the Rising Sun. In 1899-1900 he lectured on philosophy before the University of Bombay, India, and on the philosophy of religion at Calcutta, Madras, Benares, and elsewhere. His writings have

LADD—LADIES OF THE MACCABEES

been adopted as text-books in Russia, India, Japan, and other countries.

His contributions to the science of psychology have been recognized by all experts. He was one of the founders of the American Psychological Association, was its second president and its delegate to the International Congress at Paris in 1900. He is a member of the American Society of Naturalists, American Oriental Society, of the Connecticut Academy of Science, American Philosophical Association, and of the New Haven Historical Society. Among the most permanent of his achievements is the founding of the psychological laboratory at Yale University, which, under his guidance, has become one of the best equipped in the world. From Yale there has proceeded a continuous stream of teachers of philosophy, whose success has been largely due to the teaching and influence of Professor Ladd.

Ladd, Herbert Warren, American journalist and politician: b. New Bedford, Mass., 15 Oct. 1843. After obtaining a high school education he secured a position on the staff of the New Bedford *Mercury*, and went to the field with the 43d and 44th Massachusetts regiments; his report of Gen. Foster's Tarboro march was published in the Boston *Journal* before the New York papers had news of it. He issued a Sunday edition of the *Mercury* to announce the battle of Fredericksburg, the first Sunday paper published in New England outside of Boston. In 1864 he entered the dry goods business and in 1871 formed the firm of Ladd and Davis in Providence, which in 1887 was incorporated as the H. W. Ladd Company, of which he was president. He founded the Commercial Club in Providence, was vice-president of the board of trade for two years, was a generous patron of Brown University, and in 1891 presented to the University a fully equipped astronomical observatory. In 1889 he was elected governor of Rhode Island, was a candidate for that office in 1890 and was defeated, but was re-elected in 1891.

Ladd, William, American philanthropist: b. Exeter, N. H., 1778; d. Portsmouth, N. H., 9 April 1841. He was graduated at Harvard College in 1797, and subsequently took an active part in organizing the American Peace Society, of which he was for many years president, and in behalf of which he labored efficiently until the close of his life. In the interests of this society he edited the 'Friend of Peace,' commenced by Dr. Noah Worcester, and the 'Harbinger of Peace,' and published a number of essays and occasional addresses on the subject of peace. He carried his views to the extent of denying the right to maintain defensive war, and caused this principle to be incorporated into the constitution of the American Peace Society.

Ladies' Catholic Benevolent Association, a fraternal society of Roman Catholic women organized at Titusville, Pa., in April 1900. The object of the society is the payment of death benefits. In 1903 there was a supreme council, 780 subordinate branches and 77,000 members. The amount of benefits paid during 1902 was \$408,500.

Ladies of the Maccabees of the World, a fraternal beneficiary association, composed ex-

clusively of women and officered and managed by women. It exists solely for the benefit of its members and not for profit, having a lodge system with ritualistic work and representative government, and granting life protection upon satisfactory medical examination. Its jurisdiction is world-wide, but its growth until 1904 has been in North America. It is now entering Great Britain and will extend to other foreign countries where conditions are favorable.

Name.—The name is derived from the Biblical Maccabeian Dynasty, upon whose history and achievements the beneficial laws and ritualistic work are founded.

Origin.—In the 2d century before Christ, an old man named Mattathias lived with his five sons in the little village of Modin, 20 miles northwest of Jerusalem. Like all Jews of that day, they had been trained in an ardent, patriotic, and religious fervor, in which love of country was mingled with devotion to the religion so inseparably connected with that country's glorious past. Amidst the idolatrous beliefs and degraded practices surrounding them, the little Jewish nation worshiped a God who taught them justice, truth, mercy and obedience to his commands. Judge, then, how bitterly the acts of the Syrian monarch, Antiochus IV., were resented when, having taken Jerusalem by treachery, he robbed and desecrated the temple, forbade the observance of the Jewish religious ceremonies, and commanded the conquered people to worship his gods! With the deep religious feeling common to their nationality, Mattathias and his sons had also a sturdy courage and manly independence of spirit that prevented their yielding as many of their countrymen did. When summoned to sacrifice to the heathen gods, Mattathias, filled with righteous indignation, killed the king's officer and overturned the altar erected for this sacrilege. The best of the nation gathered around his standard and a terrible war ensued. Mattathias died soon after its commencement, but his son, Judas Maccabeus (see MACCABEES) led the little army to many a victory against heavy odds. The story of his life is one of high courage and devotion to right through almost incredible toil and suffering and peril. Just before the decisive battle of the war, the Jews became panic stricken and half of them deserted. Yet the heroic remnant conquered and restored the religion of their forefathers. After this marvelous victory Judas Maccabeus and his army set apart a portion of the spoils for the widows and orphans of their deceased comrades. This generous and humane act of the ancient Jewish hero is the inspiration of the Ladies of the Maccabees of the World in their care of the orphaned and needy and their protection of the home.

Founders.—The first Supreme Record Keeper was Miss Bina M. West. She established the association in the original 16 States of its jurisdiction, revised and developed its ritualistic work, assisted in combining the separate State jurisdictions under one central government, and instituted the system of general management. Hers was the responsibility of entering new States and unifying the forces of the old. To her efforts were joined in 1895 those of Mrs. Lillian M. Hollister, present Supreme Commander. The success of the Order

LADOGA

is due largely to the combined efforts and executive ability of these two leaders. Miss West was born in Saint Clair County, Mich., the daughter of Alfred J. and Elizabeth Conant West, a descendant of Roger Conant, first governor of Massachusetts Colony. In 1891, when there were but 3,000 members in the State jurisdiction of Michigan, she was so signally successful as State organizer that she was made a member of the Great Executive Committee. When the Supreme Hive was instituted 1 Oct. 1892, with world's jurisdiction, she was one of its incorporators and founders. Serving continually as Supreme Record Keeper she has seen the association rise to a position of pre-eminence. The certificates in force amounting to \$100,000,000 bear her signature, and in disbursing the Order's benefits she has signed warrants for nearly \$4,000,000.

Mrs. Hollister entered the State jurisdiction of Michigan in 1891, and in 1893 became Great Commander of the Great Hive. Its membership then numbered 13,339, which increased to 30,418 during the two years and eight months of her administration. In 1895, while the Order was in its infancy with only 5,770 members, when representing the Great Hive of Michigan at the Supreme Hive Review she was elected Supreme Commander and has managed the interests of the association with great success and ability.

History.—The origin of the Order dates back to 1886, when the first hive was organized in Muskegon, Mich. It maintained a social existence until 1890, when the benefit feature was introduced. The first hive in New York was organized at Grand Island, 11 March 1891; in Ohio, at Cleveland, 15 July 1892. Other hives were formed in these three States but there was no unity, each State working under different rituals and different laws.

The Supreme Hive of the Ladies of the Maccaees of the World was organized in order to establish unity, its incorporators being members of hives in Michigan, New York and Ohio. No attempt was made to work in the States where Great Hives were already established, but hives were instituted in States not yet organized. Direct representation in the World's Association was soon accorded Michigan, New York and Ohio, all branches thereby becoming recognized as parts of the Ladies of the Maccaees of the World. In 1898, Ohio transferred its benefit certificates and consolidated wholly with the World's Order. In 1899, New York took the same action, the total membership then reaching 72,424.

With uninterrupted success and prosperity, with 150,000 members and protection of \$100,000,000 in force, this association is one of the greatest financial institutions among women of modern times. There is probably no other organization of women to-day, having the direction of business of such magnitude or so valuable to the individual member.

Government.—The government is representative. Business is conducted through the Supreme Hive, Great Hives or State bodies and subordinate Hives or local branches. The subordinate Hive works under a charter issued upon the application of 20 ladies. Great Hives are composed of representatives of subordinate Hives, and meet triennially, amending State laws and electing State officers. The Supreme

Hive is composed of representatives from each State. It meets triennially, and amends Supreme Hive laws, elects Supreme officers, and transacts other business of the Order. The business management is in charge of the Supreme Board of Trustees during the recess of the Supreme Hive. The Order is a representative organization of women, making its own laws, transacting its own business, and making and paying assessments and death benefits involving thousands of dollars, and doing other legitimate acts as outlined by its laws.

Nomenclature.—The officers are commander or president, record keeper or corresponding and financial secretary, finance keeper or treasurer, past commander, lieutenant commander, chaplain, sergeant, sentinel, picket, banner bearers, color bearers and guards. Lodges are called hives, and meetings, reviews. Strict parliamentary procedure obtains, and the mode of address is formal. The ritualistic work is dramatic, forms, ceremonies, garb, mottoes, and emblems being based upon ancient Maccabee history, and typical of the purposes of the Association.

Statistics.—On 1 July 1904 there were 149,060 members gathered in 2,679 hives in 51 States, provinces and countries. The total receipts of the Association since organization amount to \$5,056,519.33; disbursements in death benefits, relief, and general expense, \$3,982,272.21; balance on hand, \$1,074,247.12, of which \$829,070.27 is invested in government and municipal bonds, the securities required by the laws of the Order. No account is kept by the Supreme Management of the property and funds of Subordinate Hives, or the substantial amounts they expend in relief. The benefits are given upon the National Fraternal Congress Table of Rates, which is based upon the death experience of the older societies and leading life companies. The mortality rate of the Order itself is considerably below this experience. An annual valuation is made, the mortality experience computed, and the protective feature handled along scientific lines. Management expense is reduced to the minimum on a per capita basis of ten cents monthly. The Society prepares its own literature and supplies and also edits the 'Review,' a 16-page monthly sent free to its members. It is incorporated under the laws of Michigan, and authorized by the insurance departments wherever it operates.

BINA M. WEST,
Supreme Record Keeper.

Ladoga, lä'dō-gä, the largest lake of Europe, situated in Russia, between the governments of St. Petersburg on the south, Olonetz on the east, and Viborg on the north and west; greatest length, north to south, 130 miles; average breadth, about 75 miles; area, 7,156 square miles. It receives no fewer than 70 streams, the principal of which are the Volkhov and Sias, which enters it on the south, and the Svir, which enters it on the east, bearing the surplus water of Lake Onega. It contains numerous islands, and its shores are generally low. Peter the Great Canal (1718-31) and the Alexander II. Canal (1861-6) connect the Neva and the Volkhov; Sias Canal (1764-1802) and the Empress Maria Feodorovna Canal (1883) connect the Volkhov and the Sias; the Svir Canal and the Alexander III. Canal connect the Sias

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and the Svir. These canals form a navigable chain around the south of the lake.

Ladrones, là-drôñz', or **Marianne** (má-riän') **Islands**, a group of 16 islands in the North Pacific Ocean, north of the Caroline Islands. Guahan is the southernmost and largest of these islands; and next in importance is Rota. The islands have a total area of 420 square miles. The inhabitants are tall, robust, and active, and naturally acute, lively, and ingenious. Their huts are constructed of palm-trees, and divided by mats into different apartments. The islands were discovered by Magelhaens in 1521, and were settled by the Spaniards. Magelhaens called them Islas de Ladrones (Thieves' Islands), because the Pacific pirates had a rendezvous here. Toward the end of the 17th century they received the name of Mariana or Marianne Islands, from the Queen of Spain, Marianne of Austria, the mother of Charles II., at whose expense the Jesuit missionaries were sent over, who settled here in 1667. The chief inhabitants are settlers from Mexico and the Philippines. The bread-fruit tree was first discovered here. Guahan (Guam) was ceded to the United States in 1898, and the rest sold by Spain to Germany in 1899. Pop. (1850) 65,000; (1900) 10,175.

Lady-birds, beetles of the family *Coccinellidae*. This is a very large family of small beetles of rounded, convex form, usually shining and hairless. The head is retracted beneath the pronotum, the legs are short and hidden, and the elytra are usually brightly colored and marked with dark spots. These colors vary much in the same species, especially in the English *Coccinella septempunctata*,—the pet of children. The most widely known American species is the black one with two red spots (*C. bipunctata*), common all over the United States. These beetles live upon plants, shrubs, and trees, depositing their eggs in little bunches on the lower sides of the leaves. The worm-like maggots are active, searching the leaves for plant-lice, which are eagerly devoured, each kind of beetle choosing a special kind of aphid for its food. In this habit the ladybirds, which are sometimes extremely numerous, perform a valuable service, since their minute prey is highly injurious to the plants. See SCALE-INSECT.

Lady Chapel, a chapel dedicated to the Virgin Mary, and when attached to cathedrals, generally placed eastward from the altar. The lady chapel of Westminster Cathedral is that usually known as Henry VII.'s.

Lady-day, one of the quarter-days in England and Ireland, on which rent is made payable. It falls on 25 March in each year. In the Roman Catholic Church it is held as a great festival under the title of the Feast of the Annunciation. In the English Church it is observed as a feast. In France the day is termed Notre Dame de Mars.

Lady of the Lake, The, a poem by Sir Walter Scott, the most popular of his long narrative poems. The name is derived from the heroine, Ellen Douglas, who lived on an island in Loch Katrine.

Lady of Lyons, The, a play, by Bulwer-Lytton, originally called 'The Adventurer.' It was first produced in 1838.

Lady of Mercy, Our Order of, a Spanish order dating from 1218. It was founded by James I. of Aragon, in compliance with a vow made during his captivity in France. Pope Gregory IX. approved the order in 1230. It was instituted to redeem Christian captives from the Moors. The order was extended to women in 1261. A branch order instituted in France was suppressed at the time of the Revolution.

Ladyfish, **Banana-fish**, or **Bone-fish**, the name of several different marine fishes conspicuous for elegance of outline and handsome coloring. They are found mainly in the tropical regions.

Lady's Fan, The. See GIANTS CAUSEWAY.

Lady's or Fairy's Fingers, Glove, Thimble, etc., are some among many gardener's names for the purple foxglove (*Digitalis purpurea*), in regard to which much provincial folk-lore might be cited. See DIGITALIS; FOX-GLOVE.

Lady's Slipper, or Moccasin Flower, an orchid of the genus *Cypripedium*, several species of which grow both wild and cultivated in the United States. See ORCHIDS.

Lady's-Smock. See CUCKOO-FLOWER.

La'dysmith, South Africa, town of northern Natal, near the Klip River, 119 miles by rail north by west of Pietermaritzburg, and 322 southeast of Pretoria. It is situated in a hilly region about 30 miles east of the Drakensberg Mountains. During the South African war of 1899-1901 Ladysmith was besieged by a strong force of Boers. The complete investment began on 2 Nov. 1899 and the relief was not effected till 28 February of the following year, or 118 days after the Boers succeeded in isolating the town. The town was held by a garrison of about 10,000 men under Sir George White, and during the siege much damage was done by the shells of the Boer artillery. Disease also carried off many of the garrison and the inhabitants. The relief was effected by Gen. Buller after a hotly contested march by way of Pieters and Nelthorpe, to the east of the railway. Three previous attempts by the same general to relieve the town had to be abandoned owing to the strength of the Boer positions and to their superiority in long-range guns. The population numbers about 4,000.

Laennec, René Théophile Hyacinthe, ré-nâ ta-ô-fél è-à-sânt lén-nék, French physician: b. Quimper, France, 17 Feb. 1781; d. near Douarnenez, France, 13 Aug. 1826. He took his degree of doctor of medicine in 1814, and his professional reputation was already so high that in the same year he was appointed principal editor of the 'Journal de Médecine.' In 1816 he was appointed chief physician to the Hôpital Necker, and soon after made the notable discovery of mediate auscultation, that is, of the use of the stethoscope. The original discovery, however, is claimed for Auenbrugger (q.v.). In 1819 he published his 'Traité de l'Auscultation Médiate,' having read a memoir on the subject to the Academy of Sciences in the previous year. The remainder of his life was devoted to the perfecting of this new system of diagnosis, and so far as diagnosis is concerned his treatise has produced an effect not attained by any other work. The special study of Laennec was diseases of the chest, and by means of auscultation, either by

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the direct application of the ear, or of the stethoscope as an auxiliary, he elucidated the pathology of these diseases, which were previously involved in the greatest obscurity.

Laertes, king of Ithaca and father of Ulysses. He had been one of the heroes engaged in the chase of the Calydonian boar, and in the expedition of the Argonauts. The absence of his son in the Trojan war plunged him into melancholy; but the return of Ulysses restored his energies, and he took part in the fight with the suitors of Penelope.

Lætare (*le-tā'rē*) Sunday, called also MID-LENT, the fourth Sunday in Lent. The introit for the day in the Roman Catholic Church begins with the words 'Lætare, Jerusalem,' from Isaiah lxvi. 10; hence the name. On this day the music of the organ, suspended throughout Lent, is resumed.

La Farge, *la farj*, **Christopher**, American architect: b. Newport, R. I., 5 Jan. 1862. He studied at the Massachusetts Institute of Technology 1880-1, and in the office of H. H. Richardson (q.v.), and in 1884, with G. L. Heins, took charge of the architectural works of his father, John La Farge (q.v.). Since 1886 he has been a member of the firm of Heins & La Farge, whose principal work is the Cathedral of St. John the Divine, New York. Other works that may be named are the Houghton Chapel at Wellesley College; the Roman Catholic Chapel at West Point; and St. Matthew's Church, Washington, D. C.

La Farge, *John*, American artist: b. New York 31 March 1835. He was the son of Jean Frédéric de la Farge, French midshipman, who escaped imprisonment at San Domingo, 1806, and eventually settled at Philadelphia. John La Farge began life in a lawyer's office in New York, became much attracted by the Arundel prints of Giotto, turned away from the commonplace of the Hudson River School, and with a deep appreciation of Japanese art found a friend and master in William Hunt. He originally developed a taste founded on Japanese literalism, Pre-Raphaelite conventionalism and imaginative conventionalism. Japanese art has certainly determined the line of his success, and his windows in the palaces of New York and elsewhere are beyond criticism. The great 'Battle Window' in Memorial Hall, Harvard, the wall painting in Ascension Church, New York, are evidences of his skill as a colorist, however much we may criticise his inadequate conception, and weakness in drawing. Among his published works are 'Lectures on Art' and 'An Artist's Letters from Japan.'

La Farina, *Giuseppe*, *joo-sēp'pē lä fä-rē'nā*, Italian statesman and historian: b. Messina, Sicily, 20 July 1815; d. Florence 5 Sept. 1863. He studied at the University of Catania; entered the law; implicated in a revolutionary conspiracy, was compelled to flee from Sicily (1837); and finally settled in Florence (1841), where he devoted himself to historical composition. Having returned to Sicily in 1848, he was there successively member of parliament, and minister of education, public works, and the interior. After the suppression of the revolution in Sicily (1849), he resided in France and Italy, was secretary of the National Italian society, and strongly advocated Italian unity. Fol-

lowing the war of 1859, he reorganized the National Italian society, of which he became president; in 1860 was sent to Sicily to represent Victor Emmanuel; and from 1861 sat for Messina in the Italian parliament. His chief work is 'Storia d'Italia dal 1815 al 1850' (2d ed. 1860). He wrote other historical studies, such as 'Storia della Rivoluzione Siciliana nella 1848 e 49' (1851), dramas, and works of fiction.

La Fayette, *Marie Madeleine Pioche de la Vergne*, *mä-rē mad-lēn pē-ōsh dē lä vērny lä-fa-yēt*, COMTESSE DE, French novelist: b. Paris 16 March 1634; d. there 25 May 1693. All her life she was in the foremost literary circles, after marriage her house being a noted rendezvous of wits and scholars, including Mme. de Sévigné, La Fontaine, and La Rochefoucauld. Her first novel was 'The Princess de Montpensier' (1660); followed by 'Zaide' (1670), which among her works ranks next after 'The Princess of Cleves' (1678), her most celebrated work, and one of the classics of French literature. She wrote also a 'History of Henrietta of England' (1720), and 'Memoirs of the Court of France for the Years 1688 and 1689' (1731). Consult Haussouville, 'Madame de la Fayette' (1891).

Lafayette, or **La Fayette**, *Marie Jean Paul Roch Yves Gilbert Motier*, MARQUIS DE, French soldier and statesman: b. Chavagnac, near Brioude, Auvergne (in the present department of Loire), 6 Sept. 1757; d. Paris 20 May 1834. He belonged to an eminent family of France. He was educated in the College of Louis le Grand in Paris, in 1774 entered the army as an officer of the Guards, and on hearing of the declaration of independence by the American colonists determined to lend them his assistance. In 1777 he left France for America with 11 companions, among whom was Baron De Kalb, set sail from Pasages, Spain, in a yacht equipped by himself, and arrived at Georgetown, S. C., 14 April. He proceeded to Philadelphia, and to the Congress there in session volunteered his services without pay. On 31 July he was commissioned major-general, and not long after became a member of Washington's staff. He was severely wounded at Brandywine (11 September), while rallying the American forces from a retreat; was appointed to the command of an expedition for the proposed invasion of Canada, never executed owing to lack of means; and in April 1778 was ordered to join Washington at Valley Forge. On 19 May he was surprised by General Grant with 5,000 troops at Barren Hill (12 miles from Valley Forge), where he had taken post with 2,100 troops and five cannon. Though nearly surrounded by a superior force, he succeeded in extricating himself, recrossing the Schuylkill and reaching Valley Forge in safety. He received the thanks of Congress for his conduct at Monmouth (28 June), where he fought brilliantly under Lee. War between France and England having broken out, Lafayette returned (January 1779) to place himself at the disposal of the French government; obtained for the American cause financial assistance, and the reinforcement of a fleet and 6,000 troops under Rochambeau; and 11 May 1780 rejoined the American army. He was shortly afterward stationed at Tappan with a light infantry corps of observation, and was a member of the court of

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general officers by which Major André was tried and condemned to death (29 Sept.). On 20 Feb. 1781 he was sent by Washington with 1,200 New England and New Jersey troops to aid in the defense of Virginia. Reinforced, he pursued Cornwallis from near Charlottesville to Yorktown, thus materially contributing to the decisive operations by which the war was virtually concluded. He sailed from the United States in December 1781, but again returned in 1784, when he was enthusiastically received. He was called to the Assembly of the Notables in 1787, and was elected a member of the States-General, which took the name of National Assembly (1789). Two days after the attack on the Bastille he was appointed (15 July) commander-in-chief of the National Guard of Paris, and gave them the tricolor cockade. It was through his means that the lives of the king and queen were saved from the mob that had taken possession of the palace at Versailles (5–6 Oct.). After the adoption of the constitution of 1790 he resigned all command, and retired to his estate of La Grange. He had previously resigned his title, the abolition of titles having been decreed by the National Assembly. The first coalition against France (1792) soon called him from his retirement. Being appointed one of the three major-generals in the command of the French armies, he established discipline, and defeated the enemy at Philippeville, Maubeuge, and Florennes, when his career of success was interrupted by the factions of his country. During the Reign of Terror commissioners were sent to arrest him, but he escaped to Flanders. Having been captured by an Austrian patrol (19 August), he was delivered to the Prussians, by whom he was again transferred to Austria. He was carried with great secrecy to Olmütz, where he was subjected to much privation and suffering, and whence he was not released until 25 Aug. 1797. He returned to his estate at La Grange, and taking no further part in public affairs, devoted himself to agricultural pursuits. In 1818 he was chosen member of the Chamber of Deputies, where he was a constant advocate of liberal measures. In August 1824 he landed at New York on a visit to the United States, upon the invitation of the President at the request of Congress, and was received in every part of the country with the warmest expression of delight and enthusiasm. Congress voted him \$200,000 and a township of land, his own fortune having been mostly lost by confiscation during the Terror. In 1827 the Chamber of Deputies was dissolved, and Lafayette was again returned a member by the new elections. During the revolution of July 1830 he was appointed general-in-chief of the National Guard of Paris, and though not personally engaged in the event, was, through his activity and name, of the greatest service. When the National Guard was established throughout France, after the termination of the struggle he was appointed their commander-in-chief. Of Lafayette, Edward Everett said: "Who, I would ask, of all the prominent names in history, has run through such a career, with so little reproach justly or unjustly bestowed?" Consult: 'Mémoires et Manuscrits de La Fayette' (1837–40); Tuckerman, 'Life of Lafayette' (1889); Tower, 'The Marquis de La Fayette in the American Revolution' (1895).

Lafayette, lä-fä-ĕt', Ala., town and county-seat of Chambers County, on the Central Railroad of Georgia, 85 miles northeast of Montgomery. Here is the seat of Lafayette College (q.v.), founded in 1885. There is a large trade in cotton and other products, the town being a distributing point for a large section of country. Pop. (1890) 1,369; (1900) 1,629.

Lafayette, Ind., city and county-seat of Tippecanoe County, on the Wabash River, and the Cleveland, C. C. & St. L., the Lake Erie & W., and other railroads; 64 miles northwest of Indianapolis. It is the farming and manufacturing trade centre for the surrounding country; has boot and shoe factories, carpet mills, breweries, soap factories, car works, flour and woolen mills, marble works, and agricultural implement works, and other industries. The city is supplied with natural gas. Here is the seat of Purdue University and the State Agricultural College. The city contains a high school, public library, several National banks; has electric light and street railroad plants, waterworks; and an assessed property valuation of nearly \$12,000,000. In the public square is an artesian well of sulphur. The government is vested in a mayor elected every four years and a city council elected every two years. The city stands on the site of the old French fort built in 1720, called Post Oniatanon. It was surrendered to the British in 1760 and the same year was captured by the Indians. The town was first settled in 1820 and was incorporated in 1854. Pop. (1890) 16,243; (1900) 18,116.

Lafayette, La., town in Lafayette Parish; on branches of the Southern Pacific railroad; about 120 miles west by north of New Orleans. It is 41 feet above the level of the Gulf, and has a healthy climate. It is the commercial centre of a region noted for its sugar, cotton, and rice, and it is near extensive oil fields. It is the seat of the Southwestern Louisiana Industrial Institute (q.v.) and the Mount Carmel Academy (q.v.). It has good church buildings and public and parish schools. The progressiveness of Lafayette Parish is shown by the action taken to secure the location of the Industrial Institute. The act of establishment provided that the institution should be located in that parish of the Thirteenth Senatorial District which should offer the best inducements therefor to the board of trustees. The people of the parish of Lafayette offered a self-imposed tax of two mills on the dollar of the assessed valuation of their property for ten years, supplemented by liberal appropriations from the municipal corporations of the town and the parish, by cash subscriptions from private citizens, and by the private gift of a valuable site of twenty-five acres. The town has a municipal ownership of the electric-light plant and waterworks. Pop. 3,500.

Lafayette, a fish. See Goony.

Lafayette College, a Presbyterian college at Easton, Pa.; founded in 1832. It 1902 it had 30 professors and instructors; 426 students; 20,600 volumes in the library; \$258,250 in productive funds; grounds and buildings valued at over \$1,000,000; benefactions, \$408,000; income, \$68,000; number of graduates, 1,811. It was originally chartered in 1826, but owing to the failure of the legislature to make any appro-



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priation the college was not opened until 1832. Since the Civil War the college has had a notable growth. Ario Pardee of Hazelton endowed a scientific department in 1866. There are now 30 buildings, including Pardee Hall, a memorial library and the Gayley Laboratory of Chemistry and Metallurgy.

Laf'fan, Bertha Jane, "Mrs. LEITH ADAMS," English novelist. She has been on the staff of "All the Year Round" from 1878. She was married to surgeon-general Leith Adams, and subsequently to Rev. R. S. de Courcy Laffan. Her novels have been popular and among them are: "Winstowe" (1879); "Bonnie Kate" (1892); "Accessory After the Fact" (1898). She has also published several songs.

Laffitte, Jacques, zhäk lä-fet, French banker: b. Bayonne 24 Oct. 1767; d. Paris 26 May 1844. He entered the banking-house of the senator Perregaux, and in 1809 became the head of the firm, which he made one of the first houses in France. In the same year he was appointed director of the Bank of France, and in 1814 governor of the same establishment. When the credit of France, in 1815, was at a very dangerous crisis, Laffitte advanced 2,000,000 francs in ready money, by which means a necessary article in the capitulation of Paris was settled. He was elected to the Chamber of Deputies in 1816. In 1819 he was deprived of the presidency of the bank, which was bestowed on the Duke of Gaeta; yet he was in 1822 unanimously re-elected to the office of *régent de la banque* (director). Laffitte was again elected to the Chamber of Deputies in 1827, and took an active part in the revolution of July 1830, being one of the deputies who signed the protest, and declared themselves deputies of France, in spite of Polignac's order to annul the election. He became bankrupt in his latter days, and was obliged to sell all his property to pay his debts; but his Paris hôtel was preserved to him by a national subscription.

Lafitau, Joseph François, zhô-zéf frâñ-swâ lä-fé-tô, French missionary and writer: b. Bordeaux 1670; d. there 3 July 1740. He belonged to the Society of Jesus, and was for some years attached to their missions in Canada. On his return to France, he published: "Mémoire concernant la précieuse plante ging-sang de Tartarie" (1718), the plant here noticed, which was highly valued by the Chinese, having been found by Lafitau in the Canadian forests; "Mœurs des Sauvages Américains comparées aux Mœurs des premiers Temps" (1723); "Histoire des Découvertes et des Conquêtes des Portugais dans le Nouveau Monde" (1733).

Lafitte, lä-fë', Jean, American pirate and smuggler: b. France 1780; d. Silan, Yucatan, 1826 (according to some authorities, at sea 1817). He was at one time a privateer in the employ of Cartagena for the destruction of British and Spanish commerce. Soon he turned to piracy, and by 1812 was leader of a band of desperadoes who maintained headquarters on the island of Grande Terre in Barataria Bay, and thence plundered traders in the Gulf. During the War of 1812, Commodore Percy, commanding the British naval force in the Gulf waters, unsuccessfully endeavored to obtain Lafitte's co-operation in the expedition against New Orleans. Lafitte later offered his services to the

governor of Louisiana and General Jackson, on condition of full pardon for himself and followers. He assisted in the construction of the defenses of Barataria Bay, and in command of a detachment of his band participated most creditably in the battle of New Orleans (8 Jan. 1815). President Madison by proclamation confirmed the amnesty granted to the outlaws. Lafitte was a bold smuggler, and brought to Louisiana cargoes of negro slaves. He was associated with a brother, Pierre, with whom he is often confounded. He is the hero of J. H. Ingram's story, "Lafitte."

Laflamme, lä-fläm', Toussaint Antoine Rodolphe, Canadian jurist: b. Montreal 15 May 1827. He was educated at St. Sulpice College, in 1849 was admitted to the bar, became an editor of "L'Avenir," and was a member of the "Rouge" or liberal reform element in Quebec province. At the same time he continued his legal practice, and was appointed professor of the law of real property in McGill University. In 1872-8 he sat in parliament for Jacques Cartier County, in 1876 was minister of inland revenue, and in 1877-8 minister of justice.

La Follette, lä fôl-lët, Robert Marion, American lawyer and politician: b. Primrose, Wis., 14 June 1855. He was graduated from the University of Wisconsin in 1879, and the next year was admitted to the bar. He became district attorney of Dane County in 1880, retaining that position till 1884, when he took up the regular practice of his profession. In 1887 he was elected to Congress, serving till 1891; he won reputation as an orator, and as a member of the committee of ways and means took a prominent part in the framing of the McKinley Tariff Bill. At the close of his service in Congress he resumed his practice, and remained active in politics, becoming one of the leaders of the younger men in the Republican party. In 1900 he was elected governor of his State, and in 1902 was re-elected. The chief aim of his administration has been to introduce certain tax reforms and to pass a primary election law.

La Fontaine, lä fôn-tân', Fr. là fôn-tân, Jean de, French poet: b. Chateau-Thierry, Champagne, 8 July 1621; d. Paris 13 April 1695. He studied for a time without much seriousness for the priesthood, turned to literature, found a patron in the minister Fouquet and later in others of prominence, and was in habits of intimacy with Molière, Boileau, Racine, and all the first wits of Paris. The candor and simplicity of his character acquired for him the title of *le bon homme*. But he was no favorite with Louis XIV., and was the only writer of merit of the time who did not share in the royal bounty. In 1683 he was elected to the Academy. He is best known for his "Fables," which abound in keen analysis, wise lessons, and skillful descriptive passages. Both the "Tales" (1665) and the "Fables" of La Fontaine have been superbly printed. Of the former (the license of which keeps them out of many libraries) the best edition is that of 1762, with Eisen's designs and vignettes. Of his "Fables" innumerable editions have been printed; but the most magnificent is that in four volumes folio (1755-9), in which each fable is adorned with a plate. Gustave Doré also executed illustrations for these poems. La Fontaine wrote further works, including "Les Amours de Psyche," a

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romance, and 'Le Florentin' and 'L'Eunooke,' comedies; and he edited a collection of religious verse. The best edition of his works is that by Regnier in the 'Grands Ecrivains' series (9 vols. 1888-92). Consult also the study by Lafenestre (1885).

Lafontaine, Sir Louis Hippolyte, Canadian lawyer and politician: b. Boucherville, Lower Canada, October 1807; d. Montreal 26 Feb. 1864. He achieved prominence at the bar and in Dominion politics, but in 1838 was charged with high treason as implicated in Papineau's rebellion, and though not convicted, withdrew to England, thence to France, and returned to Canada only after the end of the rebellion. In 1848-51 he was premier, and in 1853 became chief justice of the Queen's bench.

La Fourche, lä foorsh, a bayou in Louisiana, and an outlet of the Mississippi River, which begins at Donaldsonville, on the right bank, and flows southeast to the Gulf of Mexico. It has a total length of 150 miles and is navigable by steamboats 100 miles from its mouth.

Lago di Castello, lä'gō dē käs-tē'lō. See ALBAN LAKE.

Lago Maggiore, lä'gō mäd-jō'rē, or **Lake of Locarno** (anciently Verbanus), a large lake in northern Italy, and Switzerland, extending from Sesto to Locarno, about 39 miles long and 7 broad. It is 621 feet above the level of the sea, and at the northern end in some places as deep as 2,500 feet. On all sides it is surrounded by hills, planted with vineyards and plantations of chestnuts, interspersed with villas. There are several islands, two of which, Isola Bella and Isola Madre, called Borromean Islands, are laid out in gardens and pleasure grounds.

Lagoon' (from the Latin *lacuna*, a gap or hollow), a name given to shallow lakes or creeks connected with the sea, which are found along low-lying coasts. It is also applied to the expanse of water in the interior of those coral reefs which present to view above the surface of the water nothing but an external fringe. See CORAL.

Lagos, lä'gōs, Mexico, city in the State of Jalisco, on the Mexican Central railroad. It lies 6,000 feet above the sea; was founded in 1563 by Francisco Martel, and after the war of independence was named Lagos de Moreno after its defender, Pedro Moreno, who died here in battle against the Spaniards in 1817. Pop. (1900) 14,000.

Lagos (lä'gōs) **Colony**, a British possession in West Africa, consisting of Lagos Island and the coast between Dahomey and southern Nigeria; area, 985 square miles. The principal products are palm oil and kernels, ivory, gum copal, cotton, rubber, cocoa, and coffee. There is a railway from Lagos to Abeokuta 60 miles inland. The government consists of a governor and executive and legislative councils. The town of Lagos, the largest on the West African coast, has a population of 35,000. Pop. of colony 85,607.

La Grande, lä-gränd', Ore., city in Union County, on the Grande Ronde River, and on the Oregon railroad; 300 miles east of Portland. It is the commercial and trading centre of an extensive live-stock, grain and fruit growing region, and has flour mills, brick works, lumber

mills, beet sugar, and other factories. Pop. (1890) 2,583; (1900), 3,000.

Lagrange, Joseph Louis, zhō-zéf lōo-é lä-granzh, COMTE, French mathematician: b. Turin 25 Jan. 1736; d. Paris 10 April 1813. His great-grandfather was a cavalry officer in the French army, who afterward passed into the service of Sardinia. When scarcely 19 Lagrange was made mathematical professor in the artillery school at Turin. In 1764 he obtained the prize of the Academy of Sciences in Paris for a treatise on the libration of the moon, and in 1776 for another on the theory of the satellites of Jupiter. About this time he made a visit to Paris, where he became personally acquainted with D'Alembert, Clairaut, Condorcet, and other savants. Soon after his return he received an invitation from Frederick the Great to go to Berlin, with the title of Director of the Academy. Here he lived for 20 years, and wrote his great work 'La Mécanique analytique.' After Frederick's death (1786) the persuasion of Mirabeau and the offer of a pension induced him to settle in Paris. He was the first professor of geometry in the Polytechnic school, and the first inscribed member of the Institute. He took no active part in the revolution, and the law for the banishment of foreigners was not put in force against him. In 1794 he was appointed professor in the newly-established Normal School (Ecole Normale Supérieure) at Paris (1794), as well as in the Ecole Polytechnique. Napoleon bestowed upon him distinguished tokens of his favor, and he became member of the senate, grand officer of the Legion of Honor, and count of the empire. The most important of his works are his 'Mécanique analytique' (1788); 'Théorie des Fonctions analytiques' (1797); 'Résolutions des Équations numériques' (1798); 'Leçons sur le Calcul des Fonctions'; and 'Essai d'Arithmétique politique.'

La Grange, lä-grānj', Ga., city and county-seat of Troup County, on the Macon & Birmingham and on the Atlanta & West Point R.R.'s; 70 miles southwest of Atlanta. A Baptist Female college and a Methodist Female college are located here. The town was settled in 1826, and was incorporated two years later. Under a charter of 1891, the city is governed by a mayor elected annually, and a council elected every two years. It has numerous industries, including cotton and cottonseed-oil mills. Pop. (1890), 3,090; (1900), 4,274.

La Grange, Ill., town in Cook County, on the Chicago, Burlington & Quincy railroad; 15 miles from Chicago. It is a suburban and residential town largely populated by Chicago business men, and has numerous churches, public and private schools, and two weekly newspapers. Pop. (1890), 2,314; (1900), 3,600.

La Grange, Ind., town and county-seat of La Grange County, on the Grand Rapids & Indiana railroad; 45 miles northwest of Fort Wayne. It is the centre of a considerable agricultural section and has numerous manufacturing industries, including flour and lumber mills, chair factories, agricultural implement works, etc. Pop. (1890), 1,784; (1900), 1,703.

La Grange, Texas, city and county-seat of Fayette County, on the Colorado River, and on the Southern P. and the Missouri, K. & T. R.R.'s; 80 miles southeast of Austin. It has a

LA GRANGE COLLEGE — LAING

cotton trade of 15,000 bales annually, and is an important shipping point for grain and live-stock. There are cotton gins and cottonseed-oil mills and other industries here. Pop. (1890) 1,626; (1900) 2,392.

La Grange College, an educational institution in La Grange, Mo.; founded in 1858 under the auspices of the Baptist Church. It had in 1901 12 professors and instructors; 161 students; 7,000 volumes in the library, and productive funds of \$12,500. Its grounds and buildings were valued at \$20,000; income, \$3,000.

La Grita, lä gré'tä, town in Venezuela, in the state of Los Andes; located in a beautiful mountain region 5,000 feet above the sea, and surrounded by coffee, sugar, and tobacco plantations. It lies 75 miles south of Lake Maracaibo. The town, which has a most delightful climate, was founded in 1576 by Francisco de Cáceres. Pop. (1900) 9,700.

La Guayra, lä gwí'rä, or **La Guaira**, city and seaport in Venezuela, about 5 miles from Caracas, on the Caribbean Sea. It was founded in 1588 and is the most important commercial city in the republic. The harbor which was formerly an open roadstead has been improved by a breakwater, and is well protected by a fort. La Guayra exports coffee, cocoa, and skins, and imports chiefly manufactured goods. There is a railroad from here to Caracas. The port was blockaded in 1903 by the British and German fleets, pending the settlement of claims against the government. Pop. 11,000.

Laguna, lä-goo'nä, N. Mex., pueblo town on the Atchison, Topeka & Santa Fé railroad; 40 miles from Albuquerque. The population, some 1,100, is composed largely of various branches of the Laguna Indians, who are industrious and self-supporting. The government granted them 17,000 acres, of which only 215 acres can be used for farming purposes.

Laguna, Philippines, a province of the island of Luzón, situated in the southern part of the island, on the south and east shores of the Bay Lagoon (q.v.); area, including dependent islands, 752 square miles. The province is mountainous in the north, and in the southwest is Mt. Maquiling, 3,666 feet high; there are a number of rivers, and the soil is very fertile. All varieties of tropical plants and trees found in the Philippines grow here; the staple products are sugar, rice, corn, cotton, tobacco, indigo, cocoanut, betel nut, and fruit and vegetables. There are a number of industries, including mills for the extraction of cocoanut oil, furniture manufacture, the manufacture of cheese, and stock raising; there is considerable export trade, products being sent to all parts of the archipelago. Civil government was established in the province in July 1902. The inhabitants are mostly Tagalogs; pop. 170,000.

La Habana, Cuba. See **HAVANA, PROVINCE**.

Lahee, Henry Charles, American writer on musical topics: b. London, England, 2 July 1856. He was educated at St. Michael's College, Tenbury, Worcestershire, where he was chorister 1865-9, and was in the English mercantile marine 1871-9. Coming to the United States he was secretary of the New England Conservatory of Music at Boston 1891-9, and since the last named date has conducted a musical agency in Boston. He has published:

'Famous Singers of Yesterday and Today' (1898); 'Famous Violinists of Yesterday and To-day' (1899); 'Famous Pianists' (1900); 'Grand Opera in America' (1901); 'The Organ and its Masters' (1902).

La Hogue, lä hög. See **CAPE DE LA HAGUE**.

Lahore, lä-hör', India, city and capital of the Panjab, on the left bank of the Ravi 265 miles northwest of Delhi. The city proper covers an area of 640 acres, and is surrounded by a brick wall 16 feet high, flanked by bastions. The streets are extremely narrow, and the houses have in general a mean appearance. Here are the fort, the palace of Jehanghir, the Pearl Mosque, the Great Mosque, the mausoleum of Runjeet Singh, etc. The European quarter and the Meean Meer cantonment (at a distance of several miles) lie outside the walls on the south and southwest. Among the modern buildings and institutions are the Panjab University, the Oriental College, Medical School, Law School, Mayo Hospital, Victoria Jubilee Hall, school of art, cathedral, railway-station, etc. In 1524 Lahore became the seat of the Mogul empire, under which it reached its greatest splendor. Before passing into the hands of the British it was the capital of the Sikhs. Pop. 176,854. Lahore division (commissionership) has an area of 24,872 square miles, and pop. 4,579,794. The Lahore district has an area of 3,648 square miles; pop. (1900) 1,075,379.

Laing, läng, Alexander Gordon, British African explorer: b. Edinburgh, Scotland, 27 Dec. 1793; d. near Timbuktu, Africa, 26 Sept. 1826. After serving for several years in the English army, he entered on his career as an African traveler in 1822, when promoted to the command of a company in the Royal African Corps. An opportunity having presented itself of proceeding on the discovery of the course of the Niger, it was arranged that he should accompany the caravan from Tripoli to Timbuktu. He left Tripoli in July 1825, in company with the Sheik Babani, and after a tedious journey of nearly 1,000 miles arrived at Ghadames; and on 3 December reached Ensala. He quitted Ensala on 10 Jan. 1826, and on the 26th entered on the sandy desert of Tenezaroff. After some fighting with the Tuaregs he arrived at Timbuktu on 18 August, the first European who had ever reached that city. After a short stay he set out on his return, but was assassinated on 26 Sept. 1826. The murder was committed by the order of the son of the prime minister of Tripoli, whose agent Babani was. He prepared for the press a work published in 1825, under the title 'Travels in the Timmannee, Kooranko, and Soolima Countries of Western Africa.'

Laing, Malcolm, Scottish historian: b. Mainland, near Kirkwall, Orkney, 1762; d. there November 1818. He is the nephew of Samuel Laing (1780-1863). He was a lawyer by profession, and later a member of Parliament, but devoted himself principally to historical investigation. He wrote a continuation of Henry's 'History of Great Britain' (1785), and 'History of Scotland' (1800), which may be regarded as supplementary to Robertson's history. In the preliminary dissertation he presents an elaborate argument to prove Queen Mary's participation in the murder of Darnley.

LAING—LAKE

Laing, Samuel, Scottish author: b. Kirkwall, Orkney, 4 Oct. 1780; d. Edinburgh 23 April 1863. Entering the army in 1805 he served in the Peninsular War and in 1834 traveled in the Scandinavian countries. He published 'Journal of a Residence in Norway 1834-6' (1836); and 'A Tour in Sweden' (1839), but is best known by his important translation of the 'Heimskringla or Icelandic Chronicle of the Kings of Norway,' with a 'Preliminary Dissertation' (1844).

Laing, Samuel, English statesman and philosophical writer: b. Edinburgh 12 Dec. 1812; d. Sydenham Hills, Kent, 6 Aug. 1897. He is the son of Samuel Laing (1780-1863). He was prominently identified with railway legislation in England, was for many years prominent in Parliament, and from 1861 to 1863 held the office of finance minister to India. Of his works, 'Modern Science and Modern Thought' (1886), and 'A Modern Zoroastrian' (1887), have occasioned some discussion. His other publications of a miscellaneous character include: 'India and China' (1863); 'A Sporting Quixote; or the Life and Adventures of the Hon. Augustus Fitzmuddle' (1886); 'The Antiquity of Man' (1890); 'Human Origins' (1892).

Laird, lārd, David, Canadian politician: b. New Glasgow, P. E. I., 1833. He was educated in the Presbyterian Theological Seminary at Truro, N. S., and subsequently established the 'Patriot' in Charlottetown, a journal which he edited for many years. In 1871 he became a member of the Assembly of Prince Edward Island, and after the admission of the province to the Dominion, was a member of the House of Commons, 1873-6. He was lieutenant-governor of the Northwest Territory 1876-81, and while minister of the interior 1873-6, concluded the Qu'Appelle treaty which extinguished by purchase the title of several tribes to 75,000 square miles of territory on the route of the Canadian Pacific railway.

Laird, John, English ship-builder: b. Greenock, Scotland, 14 June 1805; d. Birkenhead, Cheshire, England, 29 Oct. 1874. His ship yards were at Birkenhead, on the other side of the Mersey from Liverpool, and he was for a long time the head of the firm of John Laird and Sons. He was the first builder of iron steamships, and built the John Randolph, the Nemesis and the Alabama. The first was the earliest iron vessel that crossed the Atlantic; the second the first armed vessel of iron. The history of the Alabama is well known. He entered Parliament in 1861 when he retired from active business.

Lairesse, Gerard de, Dutch painter and etcher: b. Liège, Belgium, 1640; d. Amsterdam 11 June 1711. He was early a pupil of his father Regnier Lairesse and of Flemalles, and left them for Utrecht, and afterward Amsterdam, where he labored hard for perfection in his art. He first of all confined himself to models of the antique, and the classical ideals of Poussin. His work was thus distinguished by somewhat wearisome mannerism, and his pictures very frequently seem painted in an unnatural silvery, metallic tone. His masterpieces are to be seen in Amsterdam, Schleissheim, Cassel, and in the Louvre, Paris. His ideas on

art, as dictated to his pupils and associates, together with his etchings, were published after his death in two volumes, under the title 'Het Groot Schilderboek' (1712). The work has been translated into German, French and English, and has had a great influence in the art education of the 18th century.

Lais, lǟ̄s, the name of two Greek hetæræ, celebrated for their remarkable beauty. The first lived at Corinth at the time of the Peloponnesian war; the most eminent and wealthy men of the time, including Aristippus the Cyrenaic philosopher, and Diogenes, the cynic, fell under her spell. The younger Lais was the daughter of Timandra and was born at Hycara, Sicily, 422 B.C. She came to Corinth in her seventh year and was educated in her profession by the painter Apelles. Later in life she followed a certain Hippostratus to Thessaly, where she was stoned to death by women in the temple of Aphrodite. But it is impossible to sift the really historic from mere anecdotal tradition in the accounts of these women which have come down to us. Consult: Jacobs, 'Lais, die ältere und die jüngere' (1830); Wieland, 'Aristipp.'

Laity (Gr. λαός, the people). Those members of the church who are not included in the clergy. In the Roman Catholic Church the clergy are divided into eight orders: bishop, priest, deacon, sub-deacon, acolyte, exorcist, ostiarius, lector. By some authorities the episcopate and the priesthood are considered different degrees of the same order, and the lowest of the eight orders is said to belong to all who aspire to the priesthood, postulants or candidates, who are styled clerics. The Protestant Episcopal Church holds, as the prayer-book says, "that from the Apostles' time there have been three orders of ministers in Christ's Church, Bishops, Priests and Deacons." This does not deny the historic existence of other orders, and may be thought simply to interpret the sentence with which the pastoral letter of the first council of Jerusalem opens (Acts xv. 23): "The Apostles and Presbyters and brethren send greeting," the brethren being the laity. See CLERGY.

Lake (Lat. *lacus*), a body of water surrounded by land. Lakes are of two kinds—fresh-water and saline—and have been formed in various ways. Taking first the *fresh-water lakes*, these may be grouped as follows: (1) *Obstruction Lakes*.—Some of these are more or less temporary sheets of water, such as the lake-like expansions of certain rivers, and the deserted loops of river-channels. Other temporary lakes are due to the operations of the beaver; to the choking of the narrower passages of a river-channel by drifted vegetable debris or river-ice; or to the advance of a glacier across the mouth of a lateral valley. (2) *Crater Lakes*.—These occupy the craters of extinct or quiescent volcanoes. (3) *Sink Lakes*.—These lie in hollows caused by subsidence of the surface consequent upon the removal of underlying soluble rocks, such as rock-salt, and calcareous and gypseous rocks. (4) *Earth-movement Lakes*.—Unequal movements or warping of the earth's crust have occasionally originated hollows by direct subsidence. It is possible also that local elevation by affecting

LAKE—LAKE DWELLINGS

the lower ends of valleys may sometimes have obstructed the flow of rivers, and thus given rise to lakes. (5) *Glacial Lakes*.—These consist of (a) hollows of erosion or *rock-basins*, which have been excavated by glacier-ice, and (b) hollows caused by the unequal distribution or accumulation of glacial detritus during the glacial period. (6) *Subterranean Lakes*.—These are found chiefly in calcareous regions, where they occupy the underground channels which have been excavated by the chemical and mechanical action of water. *Fresh-water* lakes are very unequally distributed. They are most numerous in those regions which were overflowed by land-ice during the glacial period, as in the British Islands, Scandinavia, Finland, Canada, and the United States. Lakes occur at all heights above the sea; the most elevated being Lake Tsana in Abyssinia (7,500 feet), Lake Titicaca in the Bolivian Andes (12,500 feet), and Askal Chin in Tibet (16,600 feet). The largest lake in the world is Lake Superior, which covers an area of 31,200 square miles, and has a mean depth of about 475 feet. Lake Baikal, in central Asia, is the largest and deepest mountain lake, its area being 13,500 square miles, and its mean depth 850 feet, but in places it reaches a depth of more than 4,000 feet. Some of the mountain lakes of Europe also attain great depths; thus, Lake Geneva is 1,000 feet, Lago Maggiore 1,158 feet, and Como 1,358 feet.

Salt Lakes.—Two kinds are recognized: (a) portions of the sea cut off from the general oceanic area by epigene or hypogene agencies; (b) lakes, originally fresh-water, which have been rendered saline by evaporation and concentration. Those of the first group range in size from mere pools and lagoons up to inland seas, such as those of the great Aralo-Caspian depression. The Dead Sea and the Great Salt Lake of Utah are good examples of the second group of saline lakes, which might be defined shortly as lakes which have no outlet to the ocean. The Caspian Sea is 97 feet below the level of the Black Sea, has an area of about 170,000 square miles, and is from 2,500 to 3,000 feet deep in the deepest parts. A still more depressed area is that of the Dead Sea, the surface of which is 1,292 feet below the level of the Mediterranean Sea.

Lake. Pigments consisting of coloring matter combined with a metallic oxide are called *lakes*. They are obtained by mixing with the solution of the coloring matter a solution of alum or of a salt of tin, tungsten, zinc, or other metal, and then adding an alkali or alkaline carbonate. The precipitate which forms consists of the color combined with the oxide. Among the pigments prepared in this way may be mentioned *blue* lake, consisting of cobalt blue, indigo, or ultramarine and alumina; *madder* lake, of madder and alumina; *orange* lake, of turmeric and alumina; *carmine* lake, of cochineal and alumina, which is the finest and most important of all; *purple* lake, of logwood and alumina; and so on. The exact tint depends on the proportions of the ingredients and the mode of preparation, as the lakes do not appear to be definite compounds. Lake pigments are largely used not only in painting, but also in calico-printing, but in the latter the

metallic oxide is put upon the cloth, and the color is afterward applied.

Lake Agassiz, äg'a-si, a glacial lake once covering a large area in the Red River Valley of Minnesota, North Dakota and Canada. The lake during its existence was larger than all the Great Lakes combined. The bed of this extinct lake is now a great plain, covered with till and silt, yielding its soil to the growth of wheat and other grain. Consult Upham, 'The Glacial Lake Agassiz' (1895). See also GLACIAL PERIOD.

Lake Bonneville, bon'vel. See GREAT SALT LAKE.

Lake Carp, a fish, *Carpoides Thompsoni*, one of the carp-suckers (q.v.), inhabiting the Great Lakes.

Lake Charles, La., city and parish-seat of Calcasieu Parish, on the Calcasieu River, and Southern P. railroad, 216 miles west of New Orleans. Located on the banks of the picturesque Lake Charles it is one of the most attractive cities in the State. It has Acadia College, the Carnegie Library, Parish court house, high school and numerous churches. It was settled in 1849 and was first incorporated in 1860. Under a new charter of 1886, the city is governed by a mayor and common council, elected every two years. There are extensive cotton and rice mills here and a large trade in lumber. Pop. (1890) 3,442; (1900) 6,680.

Lake City, Fla., town and county-seat of Columbia County, on the Southern, the Florida C. and other railroads; 60 miles west of Jacksonville. Here is located the State Agricultural College and an agricultural experiment station. In 1901 the State legislature granted the town a new charter greatly enlarging its limits. The town has an important trade in cotton, lumber, turpentine, fruit, etc. Pop. (1890) 2,200; (1900) 4,013; (1902) 6,000.

Lake City, Minn., city in Wabasha County, on Lake Pepin and on the Chicago, M. & St. P. railroad, 57 miles southeast of St. Paul. It has a public library and high school, and numerous manufactures, including grain elevators, flour mills, wagon and carriage factories, foundries, machine shops, and an extensive nursery covering 1,400 acres. The city is governed by a mayor and council, and owns the waterworks and electric light plant. Pop. (1890) 2,128; (1900) 2,744.

Lake Cusk, or **Lake Lawyer**, the American cusk (q.v.).

Lake Dwellings are those constructed on artificial or partly artificial islands in lakes. The use of habitations of this nature is a subject which has engaged the attention of archæologists and others very largely since the discovery of the remains of a lake dwelling in Ireland in 1839, of similar ones in Switzerland in 1854, and subsequently of numbers of others elsewhere. The archæological interest thus attaching to these remains has drawn attention to similar dwellings being still used in various parts of the world, in Russia, the Malay Archipelago, Venezuela, New Zealand, and in a modified form in some parts of Central Africa. The first who is known to have described lake dwellings is Herodotus, who mentions that the Persians in their invasion of Thrace and Mace-

LAKE FOREST—LAKE LAHONTAN

donia in the beginning of the 5th century B.C. found certain tribes inhabiting Lake Prasias, whose dwellings were constructed on platforms supported above the surface of the lake by piles driven into its bottom.

The lake dwellings are built after two chief types, one of which has an Irish name, *crannogs*, given to it, from the fact that those of this type are chiefly found in Ireland; and the other of which has a German name, *Pfahlbauten*, because those of this type were first found in Switzerland. Crannogs are made in the following way: Great quantities of small stems, sticks, and the like, are collected and sunk by means of stones in the lake, so as to form an island. Very often advantage is taken of the existence of an island just level with the surface of the water, which can be raised a foot or two above the surface with comparatively little labor. Sometimes a few upright piles are driven in on the top after the chief part of the island has been made in the manner described. When the island is thus raised to a sufficient height it is frequently strengthened by an enclosure of stakes driven into the bottom of the lake perpendicularly. A platform of thin stems of trees, either round or split into boards, is then made on top of the island, and this supports the structures that are built on them. The crannogs of Ireland appear to have been rather used as strongholds than as dwellings.

Pfahlbauten or pile dwellings are made by driving piles into the lake bottom as a support for the platforms on which the dwellings are erected. The piles are sharpened at the lower end, and an examination shows the sharpening to have been performed partly by heat and partly by some cutting instrument, either of stone, bronze, or iron, as is proved by the fact of such instruments frequently being found on the dwellings. Greater solidity and compactness is sometimes given to the structure of vertical piles by means of stakes transversely inserted between them or notched on to them just below the top. In other cases heaps of stones are thrown down between the upright stakes, forming what is called in Germany a *Steinberg*. The upper ends of the vertical piles are brought to an exact level to allow a platform to rest on them similar to that of a crannog. Coarse gravel was frequently strewed over the platform to keep it dry, and the interstices were often filled up with mud. It was also common to make a hurdle wall round the whole artificial island by means of small branches and twigs interwoven between the outermost stakes. Huts were built on the platform in a similar manner to the rest of the structure. The walls were of stakes bound together by wattles, and covered over by a thick clay, and the roofs were probably thatched. A single platform was in many cases large enough to support a considerable number of huts. Among works on the subject consult: Munro, 'Ancient Scottish Lake-dwellings' (1882); Wood Martin, 'Lake-dwellings of Ireland' (1886); and Munro, 'Lake-dwellings of Europe' (1890).

Lake Forest, Ill., city in Lake County, on Lake Michigan, and on the Chicago & N. W. railroad, 28 miles north of Chicago. It is a suburban and residential town without industries or manufactories. There is here a seminary for young ladies, a public library, an

academy for boys and Lake Forest University (q.v.). It was settled in 1859, and is governed by a mayor and council elected every two years. Pop. (1890) 1,200; (1900) 2,215.

Lake Forest College, a school for both sexes at Lake Forest, Ill. The history of the institution shows that in 1855 a number of citizens of Chicago, under the leadership of the Rev. Robert W. Patterson, formed an association for the purpose of establishing an educational institution near Chicago which, despite its proximity to the city, would always retain the advantages of a rural situation. In February 1856 the Lake Forest Association was organized, and the 1,300 acres of land along the shore of Lake Michigan, 28 miles from Chicago, were purchased by the association, which is now the site of the town of Lake Forest. Half of the land was to be association property, every alternate lot being set aside for the university, and 62 acres being left for an "inalienable campus." The educational institution was chartered on 13 Feb. 1857, under the title Lind University. This name was changed in 1865 to Lake Forest University. The boys' department was opened first, and through the bequest of \$35,000 from the Rev. W. W. Ferry the school for girls was founded 11 years later. The college department, known as Lake Forest College, was opened in September 1876. The institution was founded by Presbyterians, but it is not denominational in its character. It has 127 professors, 1,400 students, 21,000 volumes in the library, and an income of \$120,000; productive funds \$500,000; value of grounds and buildings \$700,000. Lake Forest College is also attracting favorable notice from the literary world, owing to the fact that it has received a large endowment for a prize, a library and a lectureship, which, it is believed, will attract as much attention in the United States as the famous Bampton and Gifford lectures have done in Great Britain.

Lake of the Four Forest Cantons, a common name for the Lake of Lucerne. The city of Lucerne, and the towns of Küssnacht, Brunnen, and Flüelen are on its shores.

Lake Geneva, jē-nē'va, Wis., city in Walworth County, on the Chicago & N. W. railroad, 70 miles northwest of Chicago. Situated on Lake Geneva, the city has developed into a popular summer resort. The lake is 9 miles long and from 1 to 3 miles in width, and is fed entirely by springs. The Yerkes Observatory, belonging to the University of Chicago, is located here. There are numerous large hotels, churches, schools, a public library and other buildings. The city was incorporated in 1893 and is governed by a mayor and council elected annually. Pop. (1890) 2,290; (1900) 2,600.

Lake Herring, or Lake Whiting, a local name for certain whitefish of the Great Lakes, especially the cisco (q.v.).

Lake Lahon'tan, an extinct lake which once existed in the western part of Nevada. The pebbly beaches, and other shore-line marks are still quite distinct. It, like Lake Bonneville, in Utah, belonged to the glacial period, when what is known now as the Great Basin had much larger bodies of water than exist now in the same section. The place occupied by

LAKE SCHOOL—LAKEWOOD

Lake Lahontan is at present a saline waste, with here and there small salt lakes. Consult: U. S. Geological Survey, Monograph 11 (1885); Russell, 'Geological History of Lake Lahontan.'

Lake School, or Lakists, a name formerly given to certain British poets who came forward conspicuously at the beginning of the 19th century, and endeavored to substitute a natural and simple taste for the classicism of which Addison and Pope furnish leading examples. They received their name from the picturesque lakes of Cumberland and Westmoreland, where Wordsworth, Coleridge, Southey, Wilson, and others, had fixed their residence permanently or for a time.

Lake Silversides. See SILVERSIDES.

Lake State, The, a popular name given to Michigan. Its shores are watered by Lakes Superior, Michigan, Huron, and Erie. The Indian word Michigan signifies "great lake."

Lake Sturgeon, the great sturgeon (*Accipenser rubicundus*) of the Great Lake region. See STURGEON.

Lake Trout, two salmonoid fishes of the genus *Cristivomer* inhabiting lakes in the northern United States and southern Canada, (1) the Great Lake trout (*C. namaycush*) ; and (2) the siscowet (*C. siscowet*). The former, and more important, occurs in most of the larger lakes and ponds from New Brunswick to Idaho and Vancouver Island, and throughout northern Canada and Alaska. The Canadians call it namaycush, and by other Indian names; in Maine and Vermont it is known as "togue" and "longe" respectively; and on the upper Great Lakes as Mackinaw trout. It is the largest of the trout family, sometimes exceeding 100 pounds in weight, but the average specimen weighs from 15 to 20 pounds; the biggest fish are found in the largest and deepest lakes. It is trout-like in form, thin-skinned, with little or no underlying fatty tissue, and dark gray spotted with round paler spots sometimes of a slightly reddish tinge. It is fierce and voracious, seizing and feeding upon "all fishes with soft fins" and anything else edible that falls in its way; and when mature it can hold its own against any other depredator, so that it may be regarded as ruler of the lakes. It spawns on the reefs in the late autumn, but otherwise dwells in the deeper waters; Jordan says that the usual number of eggs deposited at one spawning is only 5,000 or 6,000. As a game-fish it seems variable, in some waters affording good sport by trolling with a spoon-bait or live minnow, and in others having small repute among anglers. All agree, however, as to the excellence of its flesh on the table; and it furnishes a commercial fishery on the Great Lakes only excelled in importance by that for whitefish. These trout are usually caught by vast gill-nets operated by steam vessels, and three or four tons are sometimes taken in a single haul. About 1885 the supply in the Great Lakes was diminished to an alarming extent; but artificial propagation by the State and National governments soon restored the quantity, so that at the beginning of the present century more could be taken by fishermen than could profitably be sold. It is outranked in market-price and demand, however, by the whitefish.

The siscowet is very similar, but has a deeper body, thicker skin, beneath which is an excessive development of fatty tissue, and paler coloration. It is rarely seen outside of Lake Superior, where it is numerous in deep water. Consult: Goode, 'American Fishes' (1888); Jordan and Evermann, 'American Food and Game Fishes' (1902); Sage and Cheney, 'Salmon Trout' (1902).

Lake of the Woods, a boundary lake, partly in the Province of Ontario, Canada, and partly within the State of Minnesota, 220 miles west of Lake Superior, and 377 feet above its level. It is broken by one long promontory and several smaller ones into distinct portions, of which only the southern, containing Big Island, is properly designated the Lake of the Woods, while the eastern bears the name of White Fish Bay, the northern, which is studded with islands, being called Clear Water Lake, and the northwestern, Shoal Lake. The whole expanse of water forms a single lake of very irregular shape about 70 miles in length and 60 in breadth, the water area being about 1,500 square miles. Rainy River, the principal feeder of the lake, enters it at its southeastern extremity, just below Fort Louise; its discharge is at the north by the Winnipeg. It abounds with sturgeon. The boundary between Canada and the United States follows the Rainy River to its mouth in the lake, and then proceeds across the lake in such a way as to leave Big Island to Canada, whilst giving most of the Lake of the Woods proper to Minnesota. A little west of the meridian of 95° the boundary strikes due south to meet the parallel of 49°, which is then followed, the result being that the United States owns an isolated portion of the land on the northwest shore. There are gold mines in the neighborhood.

Lake-to-Sea Commission. In 1903 President Roosevelt appointed three commissioners to act in behalf of the United States in co-operation with a similar body representing Great Britain, to investigate the question of water routes from the Great Lakes to the Atlantic Ocean. The authority for the President's action is contained in the River and Harbor bill. The commissioners are particularly required "to report upon the advisability of locating a dam at the outlet of Lake Erie." The project which this commission is charged to examine is so vast, not only in its bearing upon the inland commerce of the North American continent, but in its possible effect upon the political relations between the United States and Canada, that its serious consideration by a body of official experts representing the two governments directly concerned becomes a matter of international interest. The idea of an international commission to inquire and report upon the effect of the diversion of the waters of the Great Lakes originated several years since with the Hon. Andrew H. Green of New York, who for nearly 20 years from its organization was a member of a Commission of the State Reservation at Niagara Falls.

Lake'wood, N. J., township and village of the same name in Ocean County; the town is a famous health and winter resort, surrounded by an extensive pine forest, in which are numerous lakes. Here are numbers of large hotels and

LAKEY.—LALLY-TOLLENDAL

many cottages owned by residents of New York and Philadelphia. Known for more than a score of years to a few, discovered and originally promoted by men who found here the conditions which were a necessity of long life, and developed and made successful by the presence of manifold advantages, Lakewood is known on both sides of the ocean, among the most critical and intelligent travelers from Canada to the Gulf and from the Atlantic to the Golden Gate, in Europe and on the Continent, as the most popular resort in America's Middle East. Lakewood has grown steadily in its normal population, as well as its taxable inventory. Its streets and avenues, carefully laid out and well built of stone, are kept in perfect repair during the season, and afford one of the chief charms of the place in an almost endless variety of drives. The lakes of the place, among its great charms, are protected carefully from contamination, and at once furnish an adequate water supply for fire purposes, are points of much attraction at the infrequent times when skating is available, and throughout the season a picturesque viewpoint, admired by thousands. Pop. (1900) 3,094.

Lakey, Emily Jane, American artist: b. Quincy, N. Y., 22 June 1837; d. Cranford, N. J., 24 Oct. 1866. She received her art education at the National Academy of Design in 1873 and in Paris, and made a specialty of cattle pieces. Among her paintings of this character are: 'The Leader of the Herd'; 'An Anxious Mother'; 'The Right of Way'; 'From Pasture to Pool.'

Lakshmi, lāksh'mē (Prosperity), in Hindu mythology, the wife of Vishnu and the goddess of fortune. She is the female or creative energy of Vishnu, and hence is in many cases regarded as an expression of the attributes of Vishnu. She is said to have been produced from the ocean of milk when churned by the gods to obtain the beverage of immortality. She was thus born in the full flush of beauty, adorned with a diadem, and with gems on her neck and arms, bearing in her hand a lotus. As soon as she was born she betook herself to the bosom of Vishnu, to whom she was ever faithful. According to a later view, that of the worshippers of Vishnu, this god produced three goddesses, Brāhma, Lakshmi, and Chandika, the first his creative, the second his preserving, and the third his destroying energy.

Lala, Ramon Reyes, American author: b. Manila, Philippine Islands, 1 March 1857. He was educated in Hong Kong, London, and Switzerland, and after traveling extensively, returned to Manila and engaged in business. By reason of Spanish oppression he came to the United States, and was the first Filipino ever naturalized here. He became widely known in the United States as a lecturer on his native country and has published 'The Philippine Islands' (1888), and many magazine articles on allied topics.

Lalande, Joseph Jérôme le Français de, zhō-zéf zhā-rōm lē frā-n-sā dé lā-lānd, French astronomer: b. Bourg-en-Bresse, Ain, 11 July 1712; d. Paris 4 April 1807. He devoted himself to mathematics and astronomy, and was sent by the Academy in 1751 to Berlin to determine the parallax of the moon, while Lacaille went

with the same object to the Cape of Good Hope. After having finished his operations at Berlin, he was chosen member of the Academy of Sciences in Paris in the year 1753. Thenceforward no volume of their 'Transactions' appeared which did not contain some important communications from him. In 1762 he was appointed professor of astronomy in the Collège de France, where he lectured with great success to the end of his life. His chief works are his 'Treatise on Astronomy' (1764); 'History, Theory, and Practice of Navigation'; and 'Astronomical Bibliography.' He wrote all the astronomical articles for the great 'Encyclopédie,' and re-wrote them for the 'Encyclopédie Méthodique,' and contributed to various scientific periodicals, besides editing the 'Connaissance des Temps' from 1760 to 1775, and from 1794 till his death.

Lalande's Dog. See CAPE FOX.

Lalemant, lāl-mān, Gabriel, French Jesuit missionary in America: b. Paris 1610; d. Huron mission, New France, 1649. He was a nephew of Jérôme Lalemant (q.v.). In 1630 he entered the Jesuit Order, in 1646 went to New France, and was appointed to the mission among the Hurons. During the fatal invasion of the Huron country by the Iroquois he was taken prisoner, tortured, and killed.

Lalemant, Jérôme, zhā-rōm, French Jesuit missionary in America: b. France 1593; d. New France 1673. In 1609 (or 1610) he entered the Jesuit Order, then taught in educational institutions of the order, and in 1638-45 was superior of Huron Jesuit mission in New France. In 1645-50 he was superior of all the missions at New France. After a sojourn in France (1650-9), he returned to America to resume his post. Letters and reports by him appear in the great compilation of the 'Jesuit Relations' (1896-1901). Consult also Parkman, 'The Jesuits in North America' (new ed. 1898).

Lalita-Vistara, lā-li-ta-vis'ta-ra, one of the most celebrated works of Buddhistic literature, of unknown origin and antiquity, existing only in a Sanskrit version. It contains a narrative of the life and doctrine of the Buddha Sakyamuni, and is considered by the Buddhists as one of their chief works treating of religious law.

Lalla Rookh, lāl'a-rook, the greatest and most complete of all the poetic works of Thomas Moore. It consists of four narratives, of which 'Paradise and the Peri' is the finest and most popular. The scene is laid in the Far East, and the learning and ingenuity of the poet, as well as his brilliant imagery and musical versification combine to produce an oriental romance unequaled in the English language. The four stories are told to Lalla Rookh by her lover who attends her on a journey in the disguise of a minstrel. 'Lalla Rookh' was first published in 1817.

L'Allegro, lā-lā'grō, the title of a famous lyrical poem by John Milton, written about 1632.

Lally-Tollendal, lä-lē-tō-lōn-däl, Thomas Arthur, COMTE: b. Romans Dauphiné 1702; d. 9 May 1766. He was of Irish parentage, his father having followed the fortunes of James II. Trained to arms, he was made brigadier

LAMAISM

on the field of Fontenoy for distinguished bravery. He accompanied the Pretender to Scotland in 1745, and in 1756 was selected to restore the French influence in India, for which purpose he was made governor of Pondicherry. He failed in this, surrendered Pondicherry in 1761, and was brought prisoner to England. The following month he was allowed to return to France, where, after a long imprisonment, he was condemned and executed (1766) for treachery, etc. His son (Trophime Gerard, 1751-1830), supported by Voltaire, obtained in 1778 a complete authoritative vindication of his father's conduct.

Lamaism, lä'mä-izm, an Asiatic religious belief, which is a mixture of Buddhism (see BUDDHA), Sivaism (see SIVA) and Shamanism (q.v.). It prevails from the borders of Tibet to the banks of the Volga. It is the religion of Manchuria, Mongolia and Siberia, and is found in various localities in China proper. Its adherents number more than 10,000,000.

History.—Lamaism was not known in Tibet before the 7th century A.D., when two Buddhist princesses, one from India, the other from China, shared the throne of King Sron Tsan, who adopted their religious belief. One of his successors, Thi Sron Detsan, invited Padma-Sambhava, a Buddhist monk, to preach the doctrine of the "Enlightened One" throughout the kingdom. Padma-Sambhava accordingly set about with royal authority to check witchcraft and devil worship. He established, moreover, an order of Lama priests. Lamaism, however, did not reach its culmination of power until Nag-wan Lozang, the fifth Grand Lama, was in 1640 made Dalai Lama (Ocean wide Lama), and united the authority of church and state in one individual. The modern period of this Asiatic cult dates from this epoch.

Doctrine and Religious Belief.—When Padma-Sambhava first preached Buddhism to the Tibetans he took great pains to adapt it to the capacity of his hearers, and even to their prejudices. He therefore accepted their assent or conformity as sufficient evidence of their belief. It was impossible to drive out their ancestral mysticism, practice of magic, and devil worship, and all of these continued to form elements in Lamaism. In this system the cosmogony of Buddhism is preserved intact with the Buddhistic conception of heaven and hell, and the Buddhist canon of morality, and, like the system of the "Enlightened One," Lamaism knows no worship but that of saints. Its essential creed comprises "the three most precious jewels," namely, "the Buddha-jewel," the "doctrine-jewel," and the "priesthood-jewel." Buddha is not god nor creator; but merely the founder of a doctrine, saintly, preeminently wise, powerful, virtuous and beautiful. The doctrine is the embodiment or incarnation of Buddha, all that remained of him on earth after his absorption in Nirvana. The priesthood comprises the incarnate and non-incarnate saints, among whom are the five Buddhas of Contemplation, and myriads of solitaries who attain perfection without Buddha, besides men of supreme holiness, destined to be canonized after death. In an inferior position to these saints stand spirits, whose kings are Indra (q.v.), god of the firmament; Yama (q.v.), god of death and hell;

Yamantaka or Siva as the avenger; Vaisravana (q.v.), god of wealth; besides numerous guardian and other demons who receive worship. The worship of Lamaism is conducted with prayer, reading, hymn-singing, accompanied with loud music. The clergy are summoned by the sound of a bell; the shrines and altars are brightly adorned on festivals, and offerings are made of tea, flour and milk, etc., offerings of flesh being forbidden. Rosaries, prayer wheels, amulets, charms and symbols are employed by the priests, while sometimes a part of public worship is taken up with rites of magic; charms are recited, spells are cast, incantations made, while the worshippers consult those who are reputed to be diviners, necromancers, or astrologers.

Religious Festivals.—The three principal are the New Year, in February, when the return of spring is celebrated as the triumph of Buddha, the "Enlightened One," over six heretical teachers. The second festival is held in commemoration of the incarnation of Buddha and marks the day of his mundane conception; it is the most ancient of these holy days. Third in order comes the Water Festival, marking the approach of autumn and the fall of fertilizing rain.

Religious Rites.—The two principal rites in Lamaism are baptism, and admission to discipleship, the former administered the 3d or 10th day after birth; the latter, as soon as the child can walk and speak. Marriage is a civil contract, but the lama fixes the day, and is feed accordingly; he also receives gifts for rescuing the dead from Yama by religious rites and incantations. It is the lama or priest that attends the dying man or woman, to see that dissolution between body and soul is properly accomplished, and to guide the soul to the western paradise.

Hierarchy.—There are two hierarchs, or spiritual heads, to the followers of Lamaism, Dalai-Lama (Ocean wide Lama), whose seat is at the hill of Potala, near Lhasa, who is really the head and chief of the hierarchy, and all Lamaists in Tibet, Mongolia and China are his children and subjects; the other is Teush-Lama. His official title is "the great teacher-jewel." There are two ranks below these. These orders are supposed to be the reincarnations of the Buddhist saints. The subject of reincarnation plays a prominent part in Lamaism. When the Grand Lama dies his soul is reborn in some child whose birth is coincident in time with his death. Who this child may be out of the many born at that moment used to be decided by lot, unless the deceased had announced before his death the name of the family in which he was about to reappear. At present the emperor of China has great influence in deciding the point.

There are four orders of inferior clergy who generally live in lamaseries or convents and make no claim to be reincarnations of the saints. The lamasery consists of a central temple surrounded by buildings—cells, library, refectory, etc. There are nunneries also where women live in prayer, study and celibacy, but these are few in number.

The Scriptures.—The sacred books are very numerous and make up from 222 to 228 volumes. First is the canon, a collection of the commands or sayings of Buddha. Second is the commentary. The canon contains 1,083

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works, which fill more than 100 volumes of 1,000 pages each. It comprises the following subjects: (1) Discipline, (2) Sermons, or homilies of the various Buddhas, (3) Philosophy and metaphysics. There are also treatises on Nirvana (q.v.), ethics, ritual, etc. Consult: Rockhill, 'The Life of Buddha, and the Early History of his Order' (1884); Köppen, 'Die lamaïsche Hierarchie und Kirche' (1859); Waddell, 'The Buddhism of Tibet' (1895).

Lamar, lä-mär', or **Lamar y Cortezar**, lä-mär' ē kör-tä-thär', José, hö-sä', Spanish-American general: b. Cuenca, Ecuador, 1778; d. San Jose, Costa Rica, 11 Oct. 1830. He went to Spain in his youth, and entering the army there fought against the French at Saragossa. He was ordered to Peru in 1815, and was governor of Callao Castle at the time of its surrender, 21 Sept. 1821. He then joined the revolutionists and in 1824 became marshal. He was elected president of Peru in 1827, caused the deposition of Sucre, president of Bolivia; provoked a war with Colombia, in which he was defeated, and on 29 June 1829 was deposed by his own officers and exiled.

Lamar, Lucius Quintus Cincinnatus, American jurist: b. Eatonton, Putnam County, Ga., 1 Sept. 1825; d. Macon, Ga., 23 Jan. 1893. He was graduated from Emory College (Oxford, Ga.), studied law at Macon, was admitted to the bar in 1847; removed in 1849 to Oxford, Miss., was there professor of mathematics in the University of Mississippi (1850-2), in 1852-5 practised at Covington, Ga., was elected to the Georgia legislature in 1853, and having returned in 1855 to Mississippi, was there elected representative in Congress in 1857 and 1859. In 1860 he resigned his seat in Congress; drafted Mississippi's ordinance of secession; and was a member of the State convention that passed it (9 Jan. 1861). Chosen lieutenant-colonel of the first Confederate regiment organized in Mississippi, he resigned from military service in October 1862, and in 1863-4 was in Europe, whither he had gone as commissioner to Russia, though he did not proceed to his post. After the war he held the chairs of ethics and metaphysics (1866-7) and of law (1867-70) in the University of Mississippi; was a representative in Congress (1873-7) and a United States senator (1877-85); and secretary of the Interior (1885-8). From 1888 he was an associate justice of the United States Supreme Court. On 27 April 1874 he pronounced before the House a eulogy on Charles Sumner, highly praised for its eloquence and generally for its liberal tone, but so displeasing in that respect to many of his constituency that they endeavored to defeat his re-election. His strong opposition to the debasement or inflation of the national currency caused the Mississippi legislature formally to direct him to renounce either his views or his seat in the Senate, both of which he declined to do. He was re-elected to the Senate by an increased majority. His oration at the dedication of the monument to John C. Calhoun at Charleston, S. C. (1887), was one of the best of his public addresses. Consult the study by Mayes, including Lamar's speeches (1896).

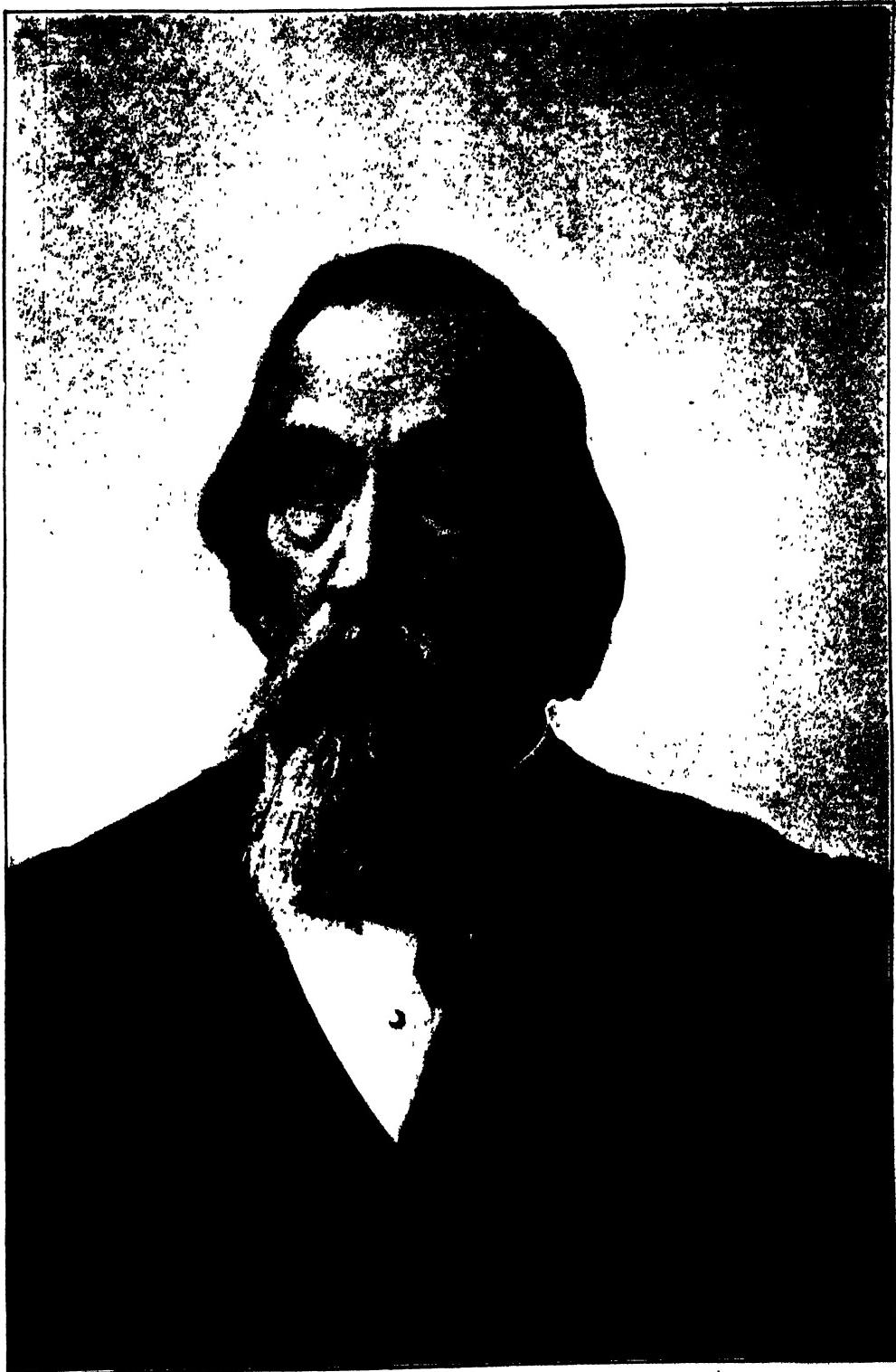
Lamar, la-mär', Mirabeau Buonaparte, American politician, second president of the

republic of Texas: b. Louisville, Ga., 16 Aug. 1798; d. Richmond, Texas, 19 Dec. 1859. After being employed a number of years in mercantile business and farming, he established in 1828 the 'Columbus Inquirer,' a journal devoted to the defense of State rights, and was actively engaged in politics until his removal in 1835 to Texas. Arriving there at the outbreak of the revolution, he at once sided with the party in favor of independence, and participated in the battle of San Jacinto, to the successful issue of which the charge of the cavalry under his command greatly contributed. He was soon after called into the cabinet as attorney-general, a position which he subsequently exchanged for that of secretary of war. In 1836 he was elected the first vice-president of Texas, having for some months previous held the rank of major-general in the army. In 1838 he was elected president, in which office he remained until 1841. Upon the breaking out of war between Mexico and the United States in 1846, he joined Gen. Taylor at Matamoras, and fought at the battle of Monterey. He subsequently stationed himself with an armed force at Laredo, where for two years he was engaged in constant conflicts with the Comanches, whose depredations on the frontier he greatly curtailed. The last public position which he held was that of United States minister to Nicaragua and Costa Rica, from which he had but lately returned when he died. He published 'Verse Memorials' (1857).

Lamar, William Bailey, American politician: b. Jefferson County, Fla., 12 June 1853. He was educated at the University of Georgia and was graduated from the Lebanon Law School, Tenn., in 1875. He was admitted to the bar in that year, practised in Tupelo, Miss., 1875-6, and then returning to Florida was clerk of the circuit court of his native county 1877-81, and county judge 1883-6. He entered the Florida legislature in 1886, was attorney-general of his State 1888-1902, and became a member of Congress from the 3d Florida district in 1903.

Lamar, Mo., city and county-seat of Benton County, on the Spring River and the Missouri P. and the Kansas City, Ft. S. & M. R.R.'s; 39 miles north of Joplin. Lamar College is located here. The city has extensive coal mining and lumbering interests and is the centre of a large agricultural district. It has a large flour trade. Pop. (1890) 2,860; (1900) 2,737.

Lamarck, Jean Baptiste Pierre Antoine de Monet, CHEVALIER DE, French scientist: b. Bazentin, Picardy, 1 Aug. 1744; d. Paris 18 Dec. 1829. He was of noble family, entered the army in 1760, but was compelled on account of an accident, to abandon active military service, after which he devoted his attention to study, first to medicine; afterward, after hearing Jussieu's illustrations of botany, he turned to the study of that science. Jussieu had intimated that the old method of classification in botany was defective and Lamarck determined to remedy the deficiency. He labored with great diligence on a treatise in which he showed the defects of the old classification, and proposed a new one, which met with general approval. He then applied his new system to the plants of France, and delivered to the Academy his 'Flore



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LATE JUSTICE OF THE UNITED STATES SUPREME COURT.

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Française, ou Description succincte de toutes les Plantes qui croissent naturellement en France.' This work was printed, by the recommendation of the Academy, at the expense of the government, for the benefit of the author (1780). Lamarck now turned his whole attention to botanical research, and made several excursions to Auvergne, and into Germany, in the last of which he was accompanied by the son of Buffon. On his return to Paris he undertook the botanical department of the encyclopædia which Panckoucke was publishing, and applied himself to this task with such assiduity that, in 1783, he produced the first half of the first volume, with an introduction, containing a sketch of the history of the science. He published the second volume in 1788. But a dispute between him and the publisher brought the undertaking to a stand, and ended Lamarck's botanical career. At the breaking out of the Revolution he was the second professor in the royal Jardin des Plantes, but in consequence of new arrangements he received a chair in the department of zoology, in which he was soon as much distinguished as he had been in botany. In his writings he shows himself a real forerunner of Darwin. Lamarck's comprehensive mind was also directed toward physics, and he published in 1794 'Recherches sur les Causes des Principaux Faits Physiques,' in which he exposes many false theories. With the same view he also wrote his 'Refutation de la Théorie Pneumatique,' etc., which appeared in Paris in 1796.

The most permanently important work of Lamarck is his 'Philosophie Zoologique,' although at the time it was published, it excited little attention. He was doubtless familiar with Erasmus Darwin's 'Love of the Plants,' which in spite of its many absurdities contained some premonitions of the great discoveries to be made by the author's greater grandson. The essence of Lamarck's theory may be stated in the following propositions: (1) Every considerable and sustained change in the conditions of life produces a real change in the needs of the animals involved; (2) change of needs involves new habits; (3) altered function evokes change of structure, for parts formerly less used become with increased exercise more highly developed, other organs in default of use deteriorate and finally disappear, while new parts gradually arise in the organism by its own efforts from within (*efforts de son sentiment intérieur*); (4) gains or losses due to use or disuse are transmitted from parents to offspring. The main point is of course contained in the last proposition, which is controverted by Darwin and Weismann, and their adherents in England and Germany. There is, however, a Lamarckian school of considerable influence in Paris, and the Neo-Lamarckians of the United States, including Cope, Hyatt and Packard, have much to support their "laws of growth" as involving the inherited effects of use, disuse and new environments. See DARWIN; EVOLUTION; HEREDITY.

Consult: Butler, 'Evolution, New and Old' (1879); Claus, 'Lamarck als Begründer der Descendenztheorie' (1888); Haeckel, 'Die Naturanschauung von Darwin, Goethe und Lamarck' (1882).

Lamarckism, lā-mär'kizm. The theory of organic evolution which, in brief, accounts for the origin of life-forms by change of environ-

ment, the exercise or use, and the disuse of organs, and the transmission of characteristics acquired during the life-time of the individual. It differs from Darwinism in lacking the principle of natural selection.

History of the Rise of the Theory.—Lamarck in 1801, after 25 years' experience as a botanist, and when as a systematic zoologist he had devoted 10 years of labor in classifying the invertebrate animals of the Paris Museum, then the most extensive zoological collection in the world, published a lecture, delivered in 1800, in which he claimed that time without limit and favorable conditions of life are the two principal means or factors in the production of plants and animals. Under the head of favorable conditions he enumerates variations in climate, temperature, change of habits, variation in means of living, of preservation of life, of means of defense, and varying modes of reproduction. As the result of the action of these different agencies or factors, the faculties of animals, developed and strengthened by use, become diversified by the new habits, so that by slow degrees the new structures and organs thus arising become preserved and transmitted by heredity. Although Lamarck did not discover the principle of natural selection, he recognized the fact of competition, of a struggle for existence, but did not dwell on them to the extent that Darwin and later observers did. In 1802, 1803, and 1806 he reiterated and somewhat extended these views, which were published in final form in 1809, in his 'Philosophie Zoologique,' and again in 1815, in the introduction to his 'Animaux sans Vertèbres.' By this time Lamarck had become the greatest zoologist of the period between Linné and Cuvier. He was expert in detecting the limits between species, and has given us the best definition extant of a species.

Lamarck's Factors of Organic Evolution.—These in their essential form are contained in his famous two laws:

First Law.—In every animal which has not exceeded the term of its development, the more frequent and sustained use of any organ gradually strengthens this organ, develops and enlarges it, and gives it a strength proportioned to the length of time of such use; while the constant lack of use of such an organ imperceptibly weakens it, causes it to become reduced, progressively diminishes its faculties, and ends in its disappearance.

Second Law.—Everything which nature has caused individuals to acquire or lose by the influence of the circumstances to which their race may be for a long time exposed, and consequently by the influence of the predominant use of such an organ, or by that of the constant lack of use of such part, it preserves by heredity (*génération*) and passes on to the new individuals which descend from it, provided that the changes thus acquired are common to both sexes, or to those which have given origin to these new individuals.

Lamarck also insisted that animals are modified in accordance with the diversity of their surroundings; that local causes, such as differences in soil, climate, etc., give rise to variations and that the whole surface of the earth affords a diversity in localities and habits, one region differing from another, that though the en-

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vironment remains the same for a long time and species remain constant for that period, yet there is a slow, gradual change, and species are modified in adaptation to such changes. Moreover such changes induce alterations in the wants or needs of animals; this necessitates other movements or actions to satisfy the new needs, and hence they give origin to new habits, and this leads to the use or exercise of some organ or organs in a new direction, with the result that different parts or organs are modified in adaptation to the new surroundings and necessities of existence. All this is perfectly true. We now know that by geographical changes or from lack of food animals are compelled to migrate into new regions, and are there obliged to adopt new habits and become transformed into new species or types. Thus whales have descended from terrestrial forms; the baleen whale has in its embryo stage rudimentary teeth showing that it is a descendant of toothed whales. Lamarck refers to Geoffroy's discovery in embryo birds of the groove where teeth should be situated, and subsequently fossil birds with teeth were unearthed. The mole with its functionless eyes, due to underground life, the blind *Proteus* of Austrian caves, the headless and eyeless bivalve mollusks, these parts lost by disuse; the evolution by atrophy of the limbs of the snake, due to their lack of use in passing through narrow places; wingless insects whose wings have been lost by disuse; the webs between the toes of ducks, geese, as well as those in the feet of the frogs, sea turtles, otter and beaver, are mentioned by Lamarck as examples of the effects of use and exercise. Other examples of use results are the origin of horns in ruminants; the long neck of the giraffe, which by the absence of herbage was obliged to browse on the foliage of trees "and to make continual efforts to reach it," the shapes of the carnivores, of the kangaroo and of the sloth, which are accounted for by the necessity of their adopting new habits, and, by exercise in new directions, becoming adapted to the new conditions of life. Although Lamarck gave few illustrations, it may be doubted whether any one has since his day more satisfactorily explained the origin of such forms or modifications. Lamarck also accounts for the origin of man, suggesting in a tentative way his rise from an arboreal or ape-like creature, with a detailed hypothesis of the gradual process of his transformation, into a being with an upright posture, an enlarged brain, powers of reason, and other human qualities. But besides these special cases Lamarck was broad and comprehensive in his views of nature and creation. He was the first to show that the animal series was not a continuous chain of being, but rather should be compared to a tree, with its branches. In fact he was the first to construct a genealogical tree, the first attempt at a phylogeny of the animal world. He demanded unlimited time for the process of evolution. He anticipated the uniformitarian views of Lyell. He pointed out that where, as in Egypt, the climatic conditions have remained the same for many centuries, species have remained constant, but that under a varying environment they become modified. He writes of the struggle for existence, shows that the stronger devour the weaker; he refers to the principle of competition in the case of

the sloth. He repeatedly insists on the fact that vestigial structures are the remains of organs which were actively used by the ancestors of existing forms. He shows, what is much insisted on at the present day, that change of functions in organs leads to their transformation or recreation, and that the assumption of new habits precede the origin of new, or the modification of organs already formed. A great deal is now said of the effects of migration and consequent geographical isolation in the origination of new species; Lamarck invoked this factor in the case of man, and he also pointed out the swamping effects of intercrossing. Lamarck's theory of use-inheritance is denied by some, but by others is regarded as an important factor in evolution. He does not, however, refer to the inheritance of mutilations, etc.

All these views lie at the foundation of the theory of organic evolution; yet Lamarck's opinions were set aside, misunderstood, and ridiculed. Some crude and ungrounded hypotheses were mingled with them. In his time the sciences of palaeontology, embryology, and bionomics were undeveloped. Lamarck collected but few facts, and he lacked the experimental skill of Darwin; so that it was reserved for the latter naturalist, half a century later, to convert the world to a belief in evolution. At present, however, it is acknowledged that Lamarckism affords the fundamental principles on which rests the theory of organic evolution, and many of the most eminent naturalists have worked and are working along Lamarckian lines.

Consult: Packard, 'Lamarck, the Founder of Evolution: His Life and Work, with Translations of his Writings on Organic Evolution' (New York, 1901); H. Spencer, 'Factors of Organic Evolution' (New York, 1895); Cope, 'The Primary Factors of Organic Evolution' (Chicago, 1896).

ALPHEUS S. PACKARD,
Professor of Zoology, Brown University.

Lamartine, Alphonse de, French poet and statesman: b. near Macon, Burgundy, 21 Oct. 1790; d. Paris March 1869. After being educated at the Jesuit College, at Belley, he spent some years without any definite occupation, devoting himself chiefly to poetry. By his first production, 'Méditations poétiques' (1820), he at once obtained a high place among the poets of the day. The 'Nouvelles Méditations poétiques' (1823) and the 'Harmonies poétiques et religieuses' (1828) established his poetic fame, and obtained for him admission into the French Academy (1830). In 1837 he was elected a member of the Chamber of Deputies. He still continued to write poetry, but his 'Jocelyn' (1835), 'La Chute d'un Ange' (1838), and 'Recueilllements Poétiques' (1839), exhibited a marked falling off from his earlier performances. In the Chamber, where he represented Bergues, Le Nord, till 1848, his fame as a political orator steadily increased. Holding liberal-conservative views, he was for a time the head of a small independent party calling itself "Le parti social," which aimed at the elevation of the people by a system of legislation based on philanthropic and religious principles. In the beginning of his political career he usually voted with the government, but at last was driven over to the opposition by the reckless obstinacy with which the government opposed all reforms. In 1847 he published his 'Histoire des

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Girondins.' After the February revolution of 1848 he became minister of foreign affairs in the provisional government. He was elected by ten departments a member of the constituent assembly, by which he was chosen a member of the executive committee. His alleged collusion with Ledru-Rollin gave the first blow to his favor with the people, which the disturbances of June converted into hatred. The tracts which he published in defense of his conduct were of no avail, and on the occasion of the elections to the Legislative Assembly in 1849 he was rejected. The place which he obtained in the last republican assembly was due to an after-election at Orleans. In consequence of the *coup d'état* of 2 Dec. 1851 he withdrew from public life. He further wrote some hasty works of small worth, including: '*Histoire de la Restauration*' (1851-3); '*Histoire de la Turquie*' (1854); '*Histoire de la Russie*' (1855); '*Le Conseiller du Peuple*' (1849-50); etc. His '*Mémoires*' appeared in 1871. His biography has been written by Pelletan (1869); Janin (1869); Maynet Domville (1888); and E. Deschanel (1893).

Lamb, Charles, *«ELIA.»* English essayist: b. London 10 Feb. 1775; d. Edmonton 27 Dec. 1834. Having entered Christ's hospital at seven, he remained in it till his 15th year, and had among his schoolfellow Coleridge, with whom he formed a lifelong intimacy. On leaving this school he was employed for a short time in the South Sea House, from which he removed in 1792 to an appointment in the accountant's office of the East India Company. Here he remained till 1825, when he retired on a pension of £441, living first at Enfield, and subsequently at Edmonton. The whole course of his domestic life was devoted to the safe-keeping and care of his sister Mary (b. London 1765), who in a fit of acute mania had stabbed her mother to the heart in 1796. She was subject to such fits all her life, but she survived her brother and died in 1847. In 1796 and 1797 some short poems by him appeared with others by Coleridge, and in 1798 he published a volume of poems with his friend Charles Lloyd, which met with little success. He was not more fortunate with a tragedy entitled '*John Woodvil*', written in imitation of the early English dramatists; and a farce entitled '*Mr. H.*', performed at Drury Lane in 1805, also proved a failure. On the other hand, his tale of '*Rosamund Gray*' (1798) was well received. In 1807 he wrote, in conjunction with his sister, a series of '*Tales from Shakespeare*', '*Mrs. Leicester's School*', and the '*Adventures of Ulysses*'. All these proved very popular books for children. In 1808 he published '*Specimens of English Dramatic Poets Contemporary with Shakespeare*', with notes in which he draws attention to the simplicity and purity of the diction of the dramatists of that period. Almost all his other productions were contributions to different periodicals of his day. By far the best known, a series of essays, appeared first in the '*London Magazine*', under the name of '*Elia*'. They have been frequently republished in a collected form since 1823, with '*Last Essays of Elia*', first issued in 1833. Here, in a style ever happy and original, and with humor of the rarest and most pungent description, he has carried the short essay to a point of excellence perhaps never before attained. With some failings

Lamb was a man of fine character, and was beloved by a wide circle of friends. Consult Talfourd, '*Life and Letters of Charles Lamb*' (1837); Talfourd, '*Final Memorials*' (1848); Ainger, '*Charles Lamb*' (1882).

Lamb, Isaac Wixom, American inventor and Baptist clergyman: b. Hartland, Mich., 8 Jan. 1840. He is known principally by his invention of the Lamb knitting machine (1863-5), which can produce more than 30 kinds of knit goods, and make about 4,000 loops in a minute at ordinary speed. He entered the Baptist ministry in 1869 and continued in the active discharge of pastoral duties till 1899.

Lamb, John, American soldier: b. New York 1 Jan. 1735; d. there 31 May 1800. He at first worked in New York with the elder Lamb in the trade of optician and mathematical instrument maker, but in 1760 entered the liquor trade. He was one of the 'Sons of Liberty' (q.v.) and active in all the early Revolutionary scenes in New York. Commissioned captain of artillery in 1775, he took part in Montgomery's expedition against Quebec, where he was wounded and made prisoner. Later, he rose to be colonel, and at the time of Benedict Arnold's treason, commanded at West Point. After the Revolution he was elected to the State legislature of New York, and for some years previous to his death held the post of customs collector of New York port. Consult the biography by Leake (1857).

Lamb, Martha Joan Reade Nash, American historian: b. Plainfield, Mass., 13 Aug. 1829; d. New York 2 Jan. 1893. She was married to Charles A. Lamb in 1852 and removed with him to Chicago, Ill., where in 1863 she was secretary to the United States Sanitary Commission Fair. She made her home in New York from 1866, and was editor of the '*Magazine of American History*' from 1883 till her death. Her publications include a scholarly '*History of the City of New York*' (1877-81); '*The Homes of America*' (1879); '*Wall Street in History*' (1883); '*The Christmas Owl*' (1881); '*Snow and Sunshine*' (1882).

Lamb, Mary Ann. See LAMB, CHARLES.

Lambayeque, läm-bä-yä'kä, Peru, capital of the department of the same name, which was created in 1874. It is situated on the Lambayeque River, about 6 miles from the Pacific Ocean, the outlets for its trade being the ports of Eten and Pimentel, with which it has railway connection. Cotton and woolen fabrics are manufactured on a small scale. Its inhabitants, mainly of mixed blood, number about 9,000. The department of Lambayeque, lying between the Pacific and the departments of Piura, Cajamarca, and Libertad, has an area of only 4,614 square miles, but contains some fertile lands which produce good crops of cotton, rice, and sugarcane. The total population of the department was estimated to be 124,091 in 1896, but is probably much less.

Lambert, Alexander, American pianist: b. Warsaw, Poland, 1 Nov. 1862. He studied in early life with his father, and on the advice of Rubinstein was sent to the conservatory at Vienna, where he graduated in 1880. In 1881 he gave a series of concerts in New York, which he repeated the next season through Germany and Russia. After studying for a while under

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Liszt he returned (1884) to the United States and in 1888 became director of the New York College of Music, a position which he still holds. He is author of many compositions, but is best known as a teacher. He has written 'Systematic Course of Studies' (1892).

Lam'bert, Daniel, English citizen famed for his unusual corpulence: b. Leicester 13 March 1770; d. 21 June 1809. Up to his 19th year he gave no indications of the remarkable stoutness which he afterward attained, being an enthusiastic lover of field sports and athletic exercises. Having succeeded his father as keeper of the Leicester prison, he exchanged an active for a sedentary life, and from this time rapidly increased in size till he became an object of public curiosity, and attracted visitors from all parts of the country. He now resolved to turn his obesity to account, and in 1806 commenced an exhibition of himself in Piccadilly, London. He afterward exhibited himself in the principal towns of England. At the period of his death he was 5 feet 11 inches in height, weighed 739 pounds, and measured 9 feet 4 inches round the body, and 3 feet 1 inch round the leg. In diet he was remarkably abstemious, drank water only, and never slept more than eight hours.

Lambert, Johann Heinrich, yō'hān hin'rīch lām'bért, German mathematician and philosopher: b. Mühlhausen 29 Aug. 1728; d. Berlin 25 Sept. 1777. His father was a tailor in humble circumstances, and he was obliged to follow his father's employment. In this situation he spent the greatest part of the night in study, and soon acquired a knowledge of mathematics, philosophy, and the Oriental languages. He afterward became tutor to the sons of Solis, president of the Swiss Confederation. In 1756 he accompanied his pupils to Göttingen, in the following year to Utrecht, and in 1758 to Paris, Marseilles, and Turin. In 1759 he was released from his duties, and in 1764 Frederick the Great appointed him to the head of the Architectural Council, and made him a member of the Academy of Sciences. He enriched the transactions of various societies with his papers and treatises, all of which bear the stamp of eminent and original genius. Most of his mathematical pieces were collected in three volumes by himself. Philosophy, and especially analytic logic, are greatly indebted to him for his 'Novum Organon, or Thoughts on the Examination and Relations of Truth' (1764); and his 'Architektonik, or Theory of the First Simple Principles in Philosophical and Mathematical Knowledge' (1771).

Lam'bert, John, English soldier: b. Kirkby Malhamdale, Yorkshire, 7 Sept. 1619; d. island of Guernsey 1686. He entered the army and had attained the rank of colonel in 1644, when he fought against the king at the battle of Marston Moor. He accompanied Cromwell into Scotland in 1650, where he distinguished himself by great gallantry, and took the lead in the council of officers who gave the protectorate to Cromwell. He subsequently opposed the Protector and was deprived by Cromwell of all his commissions, though a pension of £2,000 was allowed him for past services. When Richard attempted to assume the protectorate Lambert came forward, and became the head of the Fifth Monarchy Men, or extreme repub-

licans. In 1660 he set out for the north to encounter Monk, but was deserted by his troops, seized, and committed to the Tower whence he soon escaped. At the Restoration he was excepted from the act of indemnity, brought to trial, and condemned, but his sentence was commuted to banishment to Guernsey.

Lambert, Louis A., American Roman Catholic clergyman: b. Charleroi, Pa., 13 April 1835. He was educated at St. Vincent's College, Pa., and the archdiocesan seminary, St. Louis, and was ordained to the priesthood in 1859. He was chaplain in an Illinois regiment during the Civil War, was pastor at Cairo, Ill., 1863-9, and subsequently at Seneca Falls and Waterloo, N. Y.; founded the 'Catholic Times' in 1874, and was its editor till 1880, and has been editor-in-chief of the New York 'Freeman's Journal' since 1894. He has published 'Thesaurus Biblicus'; 'Notes on Ingersoll'; 'The Christian Father'; etc.

Lamberton, John Porter, American editor and author: b. Philadelphia 22 Oct. 1839. He was graduated from the University of Virginia in 1858, and after teaching, 1859-80, became an assistant in the library of the University of Pennsylvania. He was associate editor of the American Supplement to the Encyclopædia Britannica, 1881-90, reviser to Webster's Dictionary, 1891-5, and has edited 'Historic Characters and Famous Events' (12 vols. 1894-6); 'Literature of All Ages' (10 vols. 1897-9); 'Literature of the 19th Century' (1900).

Lam'bertville, N. J., city in Hunterdon County, on the Delaware River, the Delaware & Raritan canal and the Pennsylvania railroad; 16 miles northwest of Trenton. Water power is here furnished for extensive paper mills, rubber works, spoke factories, stone-quarries, flour mills and foundry and machine shops. The city was first incorporated in 1849, and under a charter of 1874 is governed by a mayor and council elected every two years. Pop. (1890), 4,000; (1900) 4,640.

Lamberville, Jean de, zhōn dē lāñ-bär-vēl, French missionary. In 1671, as a member of the Jesuit order and under their direction, he settled in the Iroquois village of Onondaga. He had previously spent three years in Canada, and he now became active in cementing the alliance between the Indians and the French. Meanwhile Governor Dongan of New York was straining every nerve to win over the Iroquois League to the English, but without success. Lamberville was obliged to abandon his post by the risk he ran, when the Iroquois delegates were treacherously seized at a point in Ontario to which they had repaired on receiving pledges of a peaceable conference (1687). He died in France.

Lam'beth, a parliamentary and municipal borough in London, on the south of the Thames, opposite Westminster. See LONDON.

Lambeth Articles, in English ecclesiastics, a name given certain doctrines of predestination, justification and free-will, drawn up at Lambeth Palace in 1595 by William Whitaker and other Calvinists. They were approved by Archbishop Whitgift but disapproved by Queen Elizabeth.

Lambeth Conference, an assemblage of Anglican bishops at Lambeth Palace, in England in 1867, at which 67 bishops were present.

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The second conference held in 1878 was attended by 100 bishops. In 1888 there were 145 present, and in 1897 over 190. The conference does not legislate or formulate church doctrines, but finds profit in discussing serious ecclesiastical problems. The conference will continue every 10 years. Consult 'The Lambeth Conferences of 1867, 1878, and 1888' (1889).

Lamb'kill, or Calf-kill. See SHEEP-LAUREL.

Lamb's Lettuce. See CORN-SALAD.

Lamb's-quarters, a roadside "pig-weed" (*Chenopodium album*). See GOOSEFOOT.

Lamech, name of two scriptural personages mentioned in the book of Genesis. (1) Descendant of Cain, and the first polygamist on record. (2) Son of Methusaleh, and father of Noah, lived 777 years, and died five years before the Flood.

Lamennais, Hugues Félicité Robert de, ug fā-lē-sē-tā rō-bār dē la-mē-nā, French religious and political writer: b. Saint Malo 19 June 1782; d. Paris 27 Feb. 1854. He was ordained priest in 1817. The same year appeared the first volume of his 'Essay upon Indifference in the Matter of Religion' (1807-20), a work of profound learning and of strict orthodoxy. He became the critic of Church policy, and his journal, 'L'Avenir' (The Future) was condemned by the pope. He bowed to Rome's decree; but after a year published his 'Words of a Believer' (1834), in which he repudiates all authority of popes and bishops. The little volume is written in archaic style, imitating the language of the Hebrew sacred books; and had an enormous circulation among the masses of the people in every country of Europe. It was followed by 'The Book of the People' (1837), and 'The Past and the Future of the People' (1842), in the same tone. He wrote also: 'Sketch of a Philosophy' (3 vols., 1841).

La Mesa, lá mā'sa, Colombia, a picturesque city, located on a high plain about 25 miles from Bogotá. Owing to its elevation above sea-level (4,225 feet), its climate is genial — neither so cool as that of the national capital, nor oppressively hot, as in the lowlands. The surrounding country is a fertile agricultural region. An active trade is carried on with other towns in the same department (Cundinamarca), and those in the department of Tolima. Pop. 14,000.

Lam'mas Day, in the calendar, the 1st day of August, so called perhaps from the custom which formerly prevailed among the tenants who held lands of the cathedral church in York, England, of bringing a live lamb into the church at high mass on that day.

Lammergeier, lám-ér-gi-ér, the largest of European eagles (*Gypaetus barbatus*), often called griffon-vulture because it frequently feeds on carrion, especially bones abandoned by other animals, which it has power to break, or carries to a great height in the air and then lets fall; it does the same with tortoises, which form an important part of its fare in some countries. The lammergeier is a bird of the mountains and deserts of southern Europe (where it has now been nearly exterminated), northern Africa and southern Asia; it builds a great rude nest on some mountain ledge and lays a single brown-blotted egg.

Lamon, Ward Hill, American biographer. d. Martinsburg, W. Va., 7 May 1893. He was

the law partner of Abraham Lincoln at Springfield, Ill., and after the latter's election as President became his private secretary and was appointed by him marshal of the District of Columbia. He published: 'Life of Abraham Lincoln, from His Birth to His Inauguration as President' (1872); 'Recollections of Abraham Lincoln.'

Lamon, lä-mōn', Bay of, a landlocked bay on the eastern (Pacific) coast of Luzon, Philippines, dividing the southeastern peninsula from the main part of the island. The island of Alabat and smaller islands make an inner bay on the south. The bay is bounded by the provinces of Infanta, Laguna, and Tayabas, on the south and west, and by the provinces of Tayabas and Ambos Camarines (Norte) on the south and east. On the northwest coast of the bay is the port of Lampón, Infanta, which was important in the latter part of the 16th century and the 17th century as the harbor of the Spanish galleons between Manila and New Spain, it being thought a safer way of communication than the straits of San Bernardino.

Lamont, Daniel Scott, American cabinet officer and railway official: b. Cortlandville, N.Y., 9 Feb. 1851. He was educated at Union College, entered journalism at Albany, became a political correspondent, in 1883-9 was private secretary to Grover Cleveland, was later in business, and in 1894-7 was secretary of war in Cleveland's second administration. In 1897 he was elected vice-president of the Northern Pacific railway company.

Lamp, any contrivance which through the formation of its parts affords a means of producing light, and sometimes heat, by the combustion of oils, fats or inflammable fluids, with the aid of a wick, which, by capillary attraction, conveys the substance burned to the flame point. By modern adaptation of the word many appliances for producing light by gas or electricity are designated as lamps. Man ignorant of fire is unknown, therefore, the use of the burning brand as a torch may be regarded as coeval with the race, and the torch as the progenitor of the succeeding lamp. Considered archaically the primitive lamp was a very simple device. An unworked stone, having a natural concavity, a sea shell, or the skull of an animal, constituted the earliest forms. A bit of moss, or a twist of vegetable fibre served as a wick. Fat, grease, or fish oil furnished the illuminant. The introduction of the lamp marked the first stage of man's advancement towards civilization, and may, therefore, be appropriately considered as a figure or symbol on the dial of time pointing to the dawn of his intellectual awakening. When, or where, or by what people the first lamps were made cannot now be determined. Recent archaeological discoveries in the ruins of the long buried cities of the Mesopotamian plain, Assyria, have revealed many terra-cotta lamps of a variety of forms, and of good workmanship, that were in common use 7,000 or 8,000 years B.C. It would be an unwarranted assumption to assert that these well developed creations denote the beginning of the lamp. Stone lamps have been found that are undoubtedly of great antiquity, but this fact alone does not necessarily class them as palæolithic, they are simply prehistoric, and of an age that cannot be definitely determined. The so-called Stone Age

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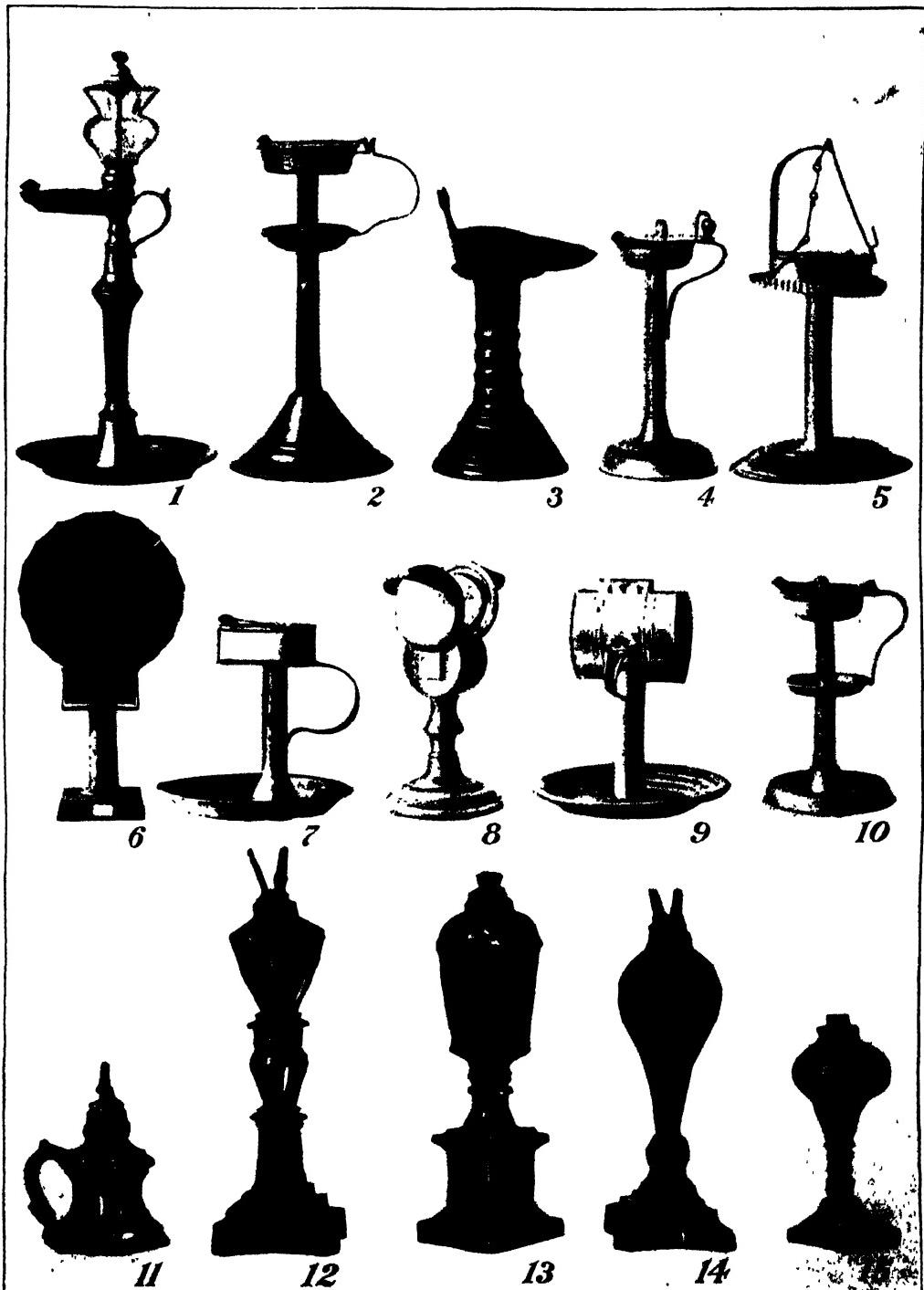
determines so little that is of real chronological value that classifications in archaeology cannot always be wisely made upon data thus furnished. French archaeologists have within a few years recovered from the lakes of Switzerland bronze lamps that were in use by the lake-dwellers at a period late in the Lacustrian Age. These are without doubt the most ancient metal lamps yet discovered.

Early Examples.—Whether the first emigrants from Asia into ancient Greece found the Pelasgic races using lamps, or whether the invaders brought the art of lamp making with them, neither legend nor tradition has left even a mythical answer. In our researches in lamp archaeology we can at the best but work our way backwards, from the known to the unknown, from the ascertained facts to that dim, mysterious darkness of remote antiquity where all traces of chronology are lost, and where our conclusions must be largely sustained by deductions drawn from analogical reasoning. The poems ascribed to Homer, 950 B.C., contain all that we know of the manners and customs of early Greek society. He speaks of the "Festival of Lamps," and makes frequent mention of the torch. The Greek and Roman torch was often simply a terra-cotta, or bronze, lamp-shaped device secured to a staff. The so-called "grease-pot-lamp" of Egypt is without doubt more ancient than the oldest lamp of Greece, and the terra-cotta lamps of Babylonia are also thousands of years older. Egypt as a nation was on the decline when the history of Greece began. Assyrian records found on clay tablets proclaim a nation with a remoteness of antiquity as yet undetermined. Among the many ancient relics discovered in the ruins of the Babylonian cities have been terra-cotta lamps that closely resembled those of early Greece. This similarity of configuration between the earliest examples discovered and those of Greek make of a period that was perhaps mid-way between the first Olympiad, 776 B.C., and the beginning of the Christian era is remarkable. Only the simplest essentials are represented. A shallow, saucer-shaped oil or fat reservoir being the most primitive of terra-cotta lamps. Then comes the oval in shape, with a slight prolongation of the rim into a short, narrow rostrum, or wick support, and the formation of a rudimentary handle. Then the oval-shape with the reservoir enclosed, and one or two wick supports. These constitute the types that were essentially common to all Eastern lands. The later Greek and Roman lamps, both terra-cotta and bronze, are remarkably rich in ornamentation, and artistically graceful in form. These constitute a division that separates the crude primitive from the finished product. The earliest terra-cotta lamps were made in one piece, and baked without glazing. Later Greek and Roman terra-cotta lamps were made in two principal parts, the "crater," or oil reservoir, and the "discus" or covering for the reservoir. Each of these parts were joined together after being molded, and then baked. The ornamentalings were generally confined to the "discus," and were called the "limbus." The "nasus," or wick support, as well as the "ansa," or handle, were most frequently made separately and carefully attached to the body of the lamp before baking. The "discus" had a small circular opening near the centre through which the lamp could be filled. Many of the

better lamps had the maker's name, and often his private mark, stamped on the bottom. Large terra-cotta lamps were frequently made with two, three, and sometimes six or even 12 "nasi." The lamp with "nasus" for one wick was called a "monomyxos," and that for two wicks a "dimyxos," and so on. The Greek and Roman bronze lamps were made in an almost endless variety of forms, and were often beautiful and artistic to a marked degree. Plain iron lamps were used by the common people at a later period. They were either cast or forged in a single piece, and were mostly ectypes of the more artistic and costly terra-cotta and bronze lamps, but were without decorations. The study of the ancient lamp maker was devoted alone to the external form of his wares. Grace, beauty and elegance, as expressed in outlines and decorations, were his chief concern. No attempt was made to improve the light. The pale, smoky, flickering flame continued to shed its uncertain light from the massive and costly silver candelabrum of the wealthy just as it had for untold ages from the simple stone and terra-cotta lamps of their ancestors. Etruscan terra-cotta and bronze lamps so closely resembled those of early Greek make that a separate description is not required in this article. The chief characteristic, however, that distinguished the true Etruscan pottery from that of Greece is the strong coloring that was applied to the former. What was true of the art of lamp making in Greece was also true of the rest of the civilized world, for it was more than 17 centuries after the Christian era before any real improvement was introduced in lamp construction.

The Inventive Age.—Prior to 1783 many lamps and illuminating appliances had been introduced, but there was little if any improvement in the light afforded, or marked advancement in the construction or mechanical arrangement of the parts designed to increase the brilliancy of the flame. The first real improvement was the introduction of the flat, woven, ribbon-like wick, and the securing the wick in a close-fitting support. This arrangement permitted only a small surface of the wick to be exposed to the flame, and the wick being narrow the flame came in contact with the centre as readily as the outward parts and thus most of the free carbon was consumed, consequently there was less smoke than in the old style of loose wick. M. Legers of Paris introduced this improvement in 1783. To this was attached for the first time a spur-wheel, which by rotating adjusted the wick, thus regulating the flame. The same year M. Argand, the Swiss chemist, introduced his improvement in burners, which consisted of a tubular wick attached to a tube which extended through the oil reservoir and opened into the base of the lamp, thus affording a means of centre draught, which supplied an abundance of oxygen to the flame and created sufficient heat to consume all of the carbon and so prevented the escaping of smoke. This was truly the beginning of a new era in lamp making, for the art now entered upon what may be designated as "the inventive age of the lamp." Science and invention now came to the aid of the artisan. Principles involving an understanding of the laws of combustion and the science of light were applied to the construction of illuminating devices. The result was more

LAMPS.



1-10. EARLY ENGLISH AND AMERICAN COLONIAL LAMPS: 1 Horologic Lamp, Pewter, 1600. 2 Old Dutch Lamp, Copper, 1640. 3 Iron Slot Lamp, Pottery Upright, Penn Dutch, 1745. 4 Old English Pewter Lamp, dated 1708. 5 Tin Newburyport (Mass.) Betty, 1724. 6 Tin Lard-oil Lamp, with reflector, 1830. 7 Portsmouth (N. H.) Betty, 1761. 8 Old English Bull's Eye Lamp, Pewter, 1770. 9 Tin Lard-oil Lamp, 1840. 10 Old English Pewter Lamp, 1720.

11-15. EARLY AMERICAN GLASS LAMPS: 11 Glass Camphene Lamp, 1845. 12 Glass Camphene Lamp, 1850. 13 Glass Whale-oil Lamp, 1830. 14 Glass Camphene Lamp, 1848. 15 Glass Whale-oil Lamp, 1760.

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light and better light. Argand's epoch making invention related wholly to his improved burner. His first lamps were simply huge oil reservoirs with his new burner attached to the top. He used sheet iron chimneys formed with a hood opening over the flame. The use of glass chimneys with the Argand burner came about purely by accident. A workman in attempting to heat a bottle over the flame cracked off the bottom, and because the glass had become too hot for him to hold he momentarily placed it over the burner. The result was surprising, the brilliancy of the flame was not only increased but the light became steady and in every way superior to that produced with a sheet iron chimney. The brilliancy of the light on the top of the huge reservoir made a wide shadow. To overcome this was a problem that was finally solved by a German lamp maker, who produced a model in which the burner was secured to the end of a long neck or rostrum, very much like the present so-called German student lamp. The removing of the light away from the great reservoir not only reduced the shadow but afforded a more ready means of supplying the oil to the wick uniformly. In 1800 Carcel introduced his ingenious lamp which was provided with a clock-work device, which operated a small pump, raising the oil from the base of the lamp to the wick-holder, thus keeping the wick uniformly submerged in the oil. This contrivance was too costly to come into general use, and was confined mostly to lamps used in halls and large rooms. Many lamps were offered by makers that were designed to burn crude, heavy whale oil, and others in which lard oil was consumed. Lard oil lamps were inconvenient in cold weather, for the oil would become solid. To overcome this several devices were invented. Perhaps the most successful was the lamp with a copper tube, the upper end of which was between two wick tubes, while the lower end passed through the oil to the bottom of the lamp. Copper being a good conductor of heat, the oil was thus kept in a liquid state while the lamp was burning. For many years lard oil was the only illuminant used in the great lamps of the lighthouses of the world. It was not until after 1880 that burners for lighthouse lamps had been constructed that would satisfactorily consume kerosene oil. Up to about 1800 but few small, portable lamps had been made. Nearly all the appliances so far introduced for domestic illumination were large, so-called, table lamps, and mural lamps. English manufacturers first made small hand lamps of tin, brass and pewter. These were mostly lard or whale oil burners, with a single wick tube. In the whale oil lamps the wick tube was round, in the lard oil lamps the flat, woven ribbon-wick was used, the wick being moved up and down in the lard oil lamps by a spur-wheel. In the whale oil lamps a small aperture in the upper part of the wick tube was provided, through which "a prick" could be inserted by which the wick was pricked up or down. In the large and important field of research and experiment in domestic illumination, American genius and skill very early took a prominent part.

Lamps in America.—Before proceeding to the introduction of a description of early American inventions relating to lamps and lighting appliances, it will be interesting to briefly notice what may be truly designated as the original

American lamp. There has never been found among the remains of the mysterious mound-builders of the Western Continent any utensil that could be rightly regarded as a lamp. The North American Indians, who were found inhabiting the country on the arrival of the first Europeans, did not possess a lamp. The pine torch was their only means of artificial illuminating. The one lamp that can claim the distinction of being really American is the stone lamp of the Eskimo. This is usually a shallow vessel of stone, most frequently of soap-stone, sometimes bone, clay, wood, and the skull of an animal is used. The oil of the seal, walrus and whale is burned in these rude lamps, dry moss serving as a wick. These lamps also serve as stoves, for they are used for cooking and warming. Without these simple lamps human life could not be maintained in the inhospitable regions these strange people inhabit.

The first lamps used in the Plymouth Colony were of Dutch make, and were called by the English emigrants Betty lamps (German, *Besser-better*). The few lamps that the Pilgrim fathers brought with them in the Mayflower on her memorable voyage were of this class. They are of iron, either forged from a single piece or were cast of gray, coarse iron. The earliest of these were known as the open Betty, or "Slot lamp." Then followed the Betty with a top, one part of which was formed as a hinged lid. The wick support was an angular, half round iron secured to the inside bottom of the lamp. There was an upright handle at the back, to which was attached, by a link, a pointed hook, the point of which extended beyond the crook. This was used to suspend the lamp from the high back of the rush-bottom chair, or the point was thrust into the crevice between the great stones of the side of the open fire-place. The Betty was pear shaped, flat on the top and bottom. This form was sometimes made in brass, but rarely was any attempt made at ornamentation. These lamps were in use in some parts of the New England colonies as late as 1790. Prior to 1680 all lamps used in the American colonies were imported, mostly from England. In 1680 a tinsmith of Newbury, Mass., began the manufacture of tin Betty lamps. These, after Newburyport was separated from Newbury, became known as Newburyport Bettys. Later these lamps were made in Rivermouth (Portsmouth, N. H.) and were called Portsmouth Bettys. In 1720 a few pewter and brass lamps had been made by small manufacturers at Salem, Mass., and Providence, R. I. These were heavy and extremely inconvenient to be carried about. Among the earliest makers of pewter lamps and candlesticks in the New England colonies was Richard Graves, a pewterer who came from England, where he had learned the trade, or, as it was then called, the art. He came first to Boston, but moved to Salem, Mass., where he long worked at his business, and brought out many fine goods in his line. Henry Shrimpton of Boston was also a maker of fine pewter lamps, and his beautiful lamps and candlesticks graced many of the grand old colonial homes. Among the earliest American experimenters in lamp construction, and inventors of improved burners, was that marvelous investigator, philosopher, statesman and inventor, Benjamin Franklin (q.v.). Not content with perfecting an improved stove known as the Franklin heater, he

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very early turned his attention to the improvement of domestic lamps. When we recall the fact that Franklin's first manual labor was cutting wicks in his father's chandler shop, it is not surprising that we find his versatile mind turning to the subject of improved illuminating appliances. Prior to 1742 candles were in general use in American colonies. The iron Betty lamps were used in a comparatively few families. The shallow, saucer-shaped clay cruise introduced from Scotland was still used for lighting among the poorer classes, but candles were the chief illuminators. Franklin's first invention consisted in devising two round wick tubes so arranged that, according to his directions given to the workmen who constructed the burner, the distance between the tubes should equal the diameter of one of them. His theory was that the proximity of the two flames created an upward draught that so increased the heat that the liberated carbon was consumed, thus adding to the light and preventing smoke. He observed that the introduction of the third burner, while it consumed a third more oil, and added a third more flame, did not give a corresponding increase in light. Franklin also suggested the improved cotton wick, loosely braided, which afforded a better medium for supplying oil to the flame by capillary attraction. Franklin did not secure patents on his inventions, but allowed manufacturers to freely introduce them, which they did on quite an extensive scale, and small portable lamps of tin and brass with Franklin burners soon became very common.

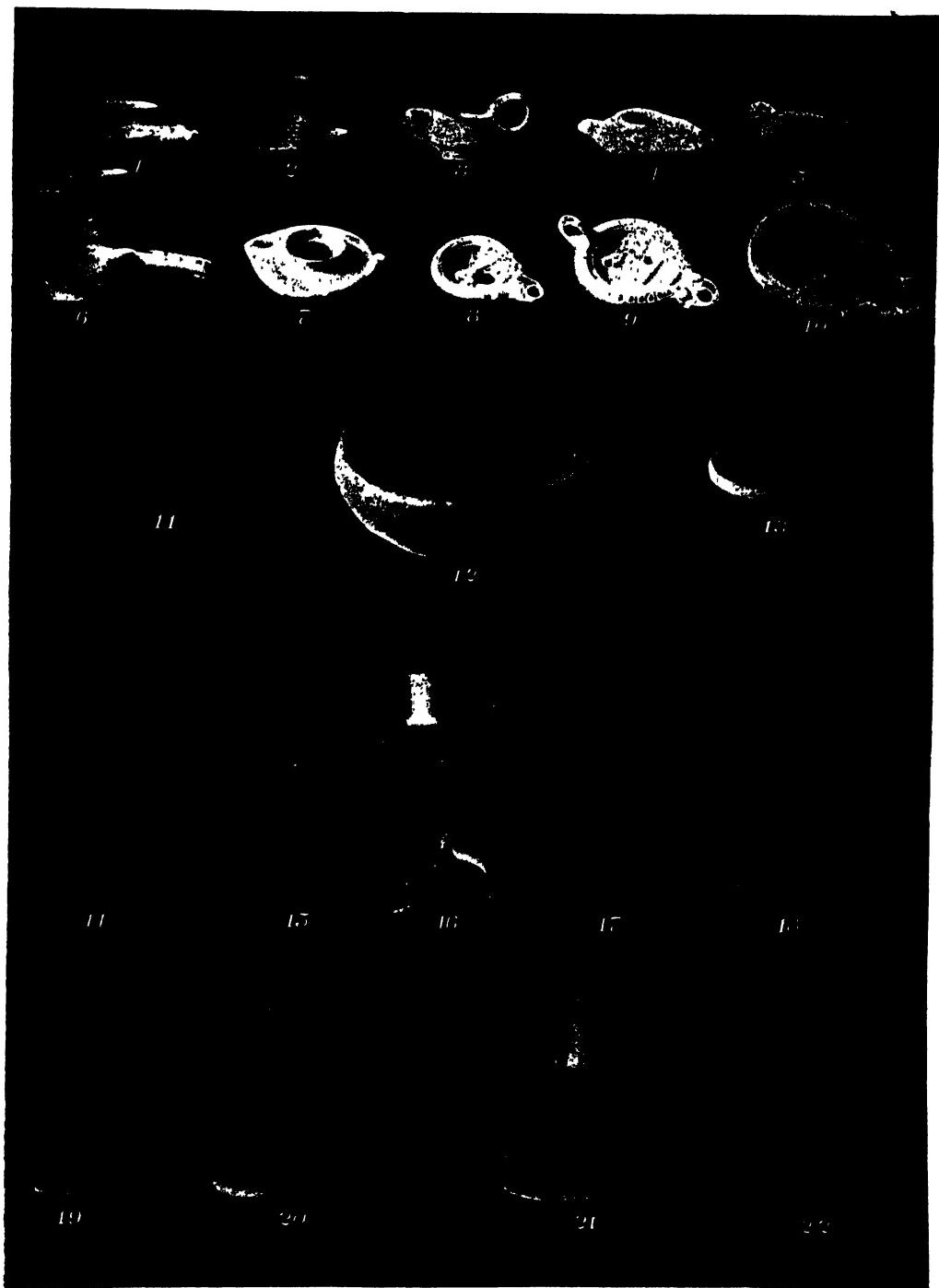
Another American of note, Benjamin Thompson, better known as Count Rumford (q.v.), in 1789 wrote an exhaustive essay on "The Management of Light in Illumination." He constructed over 100 different lamps in his extended experiments. He invented the photometer to measure the relative intensity of light emitted by different illuminants. He found that the purest white light could be obtained by means of lamps properly constructed, using clarified vegetable or animal oil, at less than one eighth of the cost for the same degree of light produced by wax candles, and for about half the cost of tallow candles. He invented but one burner. In this he constructed a centre, flat wick tube, with two similarly shaped tubes placed at acute angles on either side of the wick tube, his design being to supply oxygen through the angular tubes impinging on the wick tube. This burner did not satisfy him, and its introduction did not become general. In his further experiments he confined himself to the Argand burner, and devoted his attention to the better construction of the lamp proper. His aim was to produce a lamp in which the shadow should be eliminated as much as possible. He invented what was known as the "Astral lamp," which consisted of constructing the oil reservoir in the form of a flat, circular tube with radiating arms attached to the pedestal of the lamp, and securing the burner within the circle. He also introduced what he called the "Balloon Illuminator." This was for use in halls, ball-rooms, and salons. He also made what he called a "Dining-room Illuminator," and also a table or reading illuminator. All of Count Rumford's investigations and his extended experiments relating to lights and lamps, were carried on while he was in the public service of the Elector of Bavaria, who created him a count as a reward

for his valuable services, and as a recognition of his great learning, and the importance of his researches and inventions.

Hundreds of patents have been granted to American inventors for lamps and lamp burners. One of the earliest patents on record in the United States Patent Office was for a device in which an adaptation was made of Franklin's two wick tubes by securing them to a perforated disk through which the tubes passed. Beneath the disk was a cork through which the tubes also passed, the cork being cemented to the under side of the disk. This could then be fitted into the top of the lamp the same as a cork fits the neck of a bottle. This was mostly applied to glass lamps, which were first introduced in America in 1810. In 1812 one J. Neal, secured a patent for a lamp provided with a telescopic sliding cylinder, the wick tubes were secured to the top of the cylinder, being screwed into a collar which formed the upper part of the tube. When the lamp was filled with oil, a float on the bottom of the tube extended the cylinder to its full length. The wicks were long, reaching to the bottom of the cylinder. As the oil was consumed the cylinder was correspondingly lowered, thus keeping the wicks uniformly submerged in the oil as long as any remained in the lamp. These lamps were made in tin, brass and pewter, and became quite popular. In 1839 one J. Price of Nashville, Tenn., obtained a patent on an arrangement for burning pine knots. According to the directions the knots were to be cut up into small pieces and inserted into a tube, which had a diameter of about an inch and a half, and a base not unlike an ordinary brass candlestick. A spring inside the upright tube was compressed as the pieces of pine knots were forced in. When the tube had been filled an oval cap or cover with a large opening was placed over the top and secured by a bayonet clutch. The spring forced up the wood to be burned through the opening in the cap, as it was burned away the ash fell into a circular receptacle secured on the upright pedestal. A sheet iron chimney with a broad hood partly surrounding the flame was provided as the specification says, "to convey the ascending smoke away from the face of the person using the lamp." P. S. Moorhouse obtained a patent in 1830 for a lighting device in which balls of cotton or tow saturated with grease or fat were burned while held by an upright supporting claw secured to a pan base, in which the ash was collected. Between 1843 and 1845, S. Rust secured eight patents on lamps, and five on burners. These patents did not introduce any new features, and consisted mostly of the introduction of novelties relating to forms and supposed ornamentation. His inventions in the line of burners did not involve any new features and possessed but little real utility.

The so-called "Solar Lamps," patented in 1843 by the Philadelphia firm of Cornelius & Company, were a great improvement over any table lamp so far introduced. They were constructed to burn lard oil. The burner proper was a modification of Argand's. The wick tube, over which the circular wick closely fitted, extended through the bottom of the oil reservoir, where it was provided with openings for the admission of air. The heat conveyed through the lard oil by the wick tube served to keep the oil in a liquid state in cold weather. The burner was so con-

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1-10. PRE-HISTORIC TERRA COTTA LAMPS: 1. Assyrian, 800 B. C. 2. Phenician, 2000 B. C. 3. Persian, 2000 B. C. 4. Egyptian, 1500 B. C. 5. Assyrian, 2000 B. C. 6. Egyptian, 2000 B. C. 7. Jewish, 200 B. C. 8. Etruscan, B. C. 9. Roman, B. C. 10. Grecian, 300 A. D.

11-13. LAMPS OF ARCTIC NORTH AMERICA: 11. Eskimo Soapstone Lamp, North Greenland. 12. Eskimo Clay Lamp, Yukon Valley. 13. Eskimo Clay Lamp, North Alaska.

14-22. EARLY AMERICAN COLONIAL LAMPS: 14. Tin Betty, 1632. 15. Iron Betty, 1620. 16. Fat Lamp, Brass dish, iron upright, 1680. 17. Iron Slot Lamp, 1640. 18. Cast Iron Fat Lamp, 1700. 19. Tin "Petticoat" Lamp, Whale-oil burner, 1832. 20. Tin Whale-oil Lamp, 1812. 21. Tin Upright, Franklin burners, Whale-oil, 1750. 22. Guest Lamp, Tin, Whale-oil, used in old-time inns, 1823.

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structed that the flame was diffused more generally than in other lamps, while the bulb-shaped glass chimney created a hot-air chamber in which all free carbon was consumed. The light was profuse, white and clear. This firm manufactured a large variety of elegant lamps, which were used extensively in the homes of the wealthy. Benkler's lamp, introduced in 1840, had a tube through which air was admitted to the flame, the angle of the tube being such that an upward movement of air was produced when the oxygen came in contact with the heat, and thus a forced draught was secured which made the light constant, and aided greatly in the consumption of smoke. Through the means thus adopted, cheap heavy oils could be burned without the offensive smell and excessive smoke produced by cheaper lamps when these low grade oils were consumed.

Coal Oil and Kerosene Lamps.—About 1845 was introduced in the United States, a compound that was known as burning fluid, or from its inventor's name, Potter's fluid. This was a highly explosive illuminating fluid, composed of a mixture of about three parts of wood alcohol to one of purified oil of turpentine. This was burned in lamps provided with long slender, tapering brass tubes, secured to a disk that screwed into a collar fitted to the upper part of the lamp. The wick was round, firmly woven cotton, which closely fitted the wick tubes. This was to prevent the escape of the vapor from the fluid. Little thimble-shaped caps, secured by small chains, were provided to cover the end of the wick tubes when the lamp was not in use. This was to prevent the evaporation of the highly volatile burning fluid. Camphene was the trade name of a burning fluid composed of oil of turpentine, purified by being distilled over quick-lime. This fluid was burned in lamps provided with the same class of burners as that described for burning fluid. The highly explosive nature of these dangerous compounds rendered them unpopular for domestic use, and they were soon displaced by the safer and cheaper kerosene oil, which came into general use about 1850. This was first called coal-oil, and in some localities mineral oil, while in others it was known as petroleum oil. Many hundreds of lamps and burners have been invented to use this cheap illuminant. In all successful kerosene burners a glass chimney is necessary. Many attempts have been made to produce a kerosene burner that would afford a clear, brilliant, steady, smokeless flame, without a chimney, but so far no good, practical lamp has been put on the market that successfully accomplishes this much desired result. A lamp was made and introduced in 1869 that burned a vapor of naphtha without a chimney. While the flame from this device was white and brilliant, the light was flickering, and when moved about emitted annoying smoke. The highly explosive nature of the fluid burned made its common use unsafe, so that the vapor lamp never became popular. What is known as the German student lamp, supplied with an improved Argand burner, and the so-called Rochester lamp, employing another modification of the Argand burner, are the best and most successful kerosene lamps so far introduced. There are hundreds, if not thousands, of different kerosene oil burners attached to an almost endless variety of lamps now on the market. These embrace hand lamps, table lamps,

piano lamps, and a variety of library and parlor lamps that are remarkably rich in ornamentation and graceful in form and shape, but in the construction designed to assist the combustion of the oil in producing the illumination the same general principles are involved, and with the exception of the smaller hand lamps the original Argand burner principle is adhered to, with slight modifications and improvements. In the small hand lamps a perforated hood-shaped cap surrounds the wick making a dome-like chamber through which the air drawn from the outside is deflected into the flame, thus supplying the needed oxygen. The flat ribbon wick is used in most of the smaller lamps, the wick being moved up and down by a spur-wheel as before described.

Safety Lamps are lamps so constructed that the danger from the foul explosive air of mines, especially deep coal mines, may be lessened or prevented, by so protecting the flame of the miner's lamp that it will not come in direct contact with the mixed carburetted hydrogen and atmospheric air, which is often present in such quantities as to create an element of great danger. The first safety lamps were called "Steel-Mills," and were devices in which small steel wheels, with roughened edges, were rapidly revolved against a flint, securely held by a powerful spring. The sparks thus produced afforded an intermittent light which was sufficient to illuminate the more dangerous parts of the deep mines. But as this lamp necessitated the employment of a boy to revolve the wheel while the miner was engaged in his work, it proved too expensive for economic use. In 1813, Dr. Canny in England, introduced the first true safety miner's lamp. In his invention he produced a lamp in which the external air was admitted to the burner through a chamber containing water, while the flame was protected by a glass bulb, the product of combustion escaped through perforations in a flat support on which the glass bulb rested. This contrivance was so cumbersome, and so liable to breakage, that it never came into general use. In 1815, George Stephenson and Sir Humphry Davy, contrived a safety lamp that, with slight modifications, has continued in use up to the present time. The air to support combustion was admitted to the flame through small openings in the bottom of the lamp, while the flame was protected by a glass, upright cylinder, the top of which was covered with a wire gauze cap. Several forms introducing slight changes from the original Davy lamp have been made. The lamp in which the flame is protected by a wire gauze cylinder in the place of a glass one was a later invention of Sir Humphry Davy. Mackworth's safety lamp was an improvement over the Canny lamp, and introduced features common to that and the Davy lamp. A water chamber was provided through which the external air passed before reaching the flame. Immediately surrounding the flame was a thick, glass cylinder and above that a fine wire gauze cylinder, making a continuous protection about the flame. Outside of this was an additional wire gauze cylinder added as a means of protection against breakage. Lamps for jewelers, chemists and laboratory use are in reality miniature furnaces, and are generally provided with wide wick supports in which are large cotton wicks. Alcohol is the most common fluid used for generating heat in

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these lamps. Painter's lamps are contrivances in which naphtha is burned under pressure, the resulting heat being employed in the removing of old paint from surfaces which it is desired to repaint. Hand lanterns are simply lamps of various forms, surrounded by glass globes or cylinders to protect the flame from the wind. Ancient lanterns were provided with transparent protectors made of horn scraped thin to permit the light to be reflected through. The word lantern is a combination of lant-horn, and was employed to express a light which was protected with a transparent horn. Another form of early lantern, now designated by collectors as the "Guy Fawkes lantern" was of tin, perforated with small punctures through which the light shone. Early hall, or as they were called entry lanterns, were often massive and elegant ground glass globes, ornate and beautiful to a marked degree. Either candles or oil were used as illuminant. They were suspended by chains from the ceiling, and a glass smoke protector was provided in those of more elaborate make.

C. A. QUINCY NORTON, M.D.

Lamp'adrome, in ancient Greece, a running race with torches, customary at certain sacred festivals. The competitors were young men, to each of whom a lighted torch was given, and he who arrived first at the goal with his torch still alight was the winner.

Lamp, Electric. See ELECTRIC LIGHTING.

Lampasas, läm-pä'sas, Texas, town and county-seat of Lampasas County, on a branch of the Lampasas River, and the Texas C. and the Gulf, C. & S. Fe R.R.'s; 80 miles northwest of Austin. There is a large trade here in agricultural produce, live stock, cotton, grain, wool, and has cotton gins, wagon and carriage factories, flour-mills and other industries. Sulphur springs in the locality have attracted many invalids here. Pop. (1890) 2,400; (1900) 2,107.

Lampblack, finely divided carbon or soot, produced on a commercial scale by the imperfect combustion of organic materials that are rich in carbon, such as tar, resins, pitch, and petroleum. The combustion is usually carried out in brick furnaces, or in cast-iron vessels, to which a smaller supply of air is admitted than would be required for complete oxidation. The dense smoke that results is led through a series of settling chambers, in which the lampblack is deposited, the finest grade being precipitated in the last chamber. Lampblack so prepared contains about 80 per cent of carbon, the remaining portion consisting of oily and resinous matters, together with moisture and certain inorganic substances, such as ammonium sulphate. The resinous and other organic constituents can be removed by heating to redness in a closed crucible, after which the soot is digested with hydrochloric or sulphuric acid, and finally washed to remove the inorganic constituents. Lampblack is used chiefly in the manufacture of paints and printers' inks and for these purposes the crude product is sufficiently pure. For the manufacture of Chinese ink ("India ink") the purified soot is preferable. See also CARBON.

Lamper-eel, or Lampern, a lamprey (q.v.).

Lamp'man, Archibald, Canadian poet: b. Morpeth, Kent County, Ontario, 17 Nov. 1861; d. Ottawa, Ontario, 10 Feb. 1899. He was grad-

uated from Trinity College, Ontario (1882), and after 1883 held an appointment in the Post-office Department of Ottawa. He was a constant contributor of verse to the papers and magazines of the Dominion and the United States, and published two collections of poems, "Among the Millet" (1888); and "Lyrics of Earth" (1895), which reveal a deep love of nature and outdoor life. His "Complete Poems" with "Memoir" by D. C. Scott appeared in 1900.

Lam'prey, an eel-like creature of the group *Cyclostomi* and family *Petromyzonidae*. The anatomical characters are described under *Cyclostomi*. The lampreys feed principally on fishes, to which they attach themselves by their suctorial mouths, and then scrape away the flesh with their rasp-like teeth. There are about 7 genera and 15 species, living mostly in the north temperate zone. Lampreys inhabit both salt and fresh waters, but those of the sea ascend rivers and brooks to deposit their spawn on pebbly shallows, and great numbers die there. Most of them are plainly dark colored, but some of the fluviatile species are bluish or silvery, as the common one (*Ichthyomyzon concolor*), in the Upper Mississippi Valley and Great Lakes, which is about a foot long. The sea-lamprey (*Petromyzon marinus*) is larger, often three feet long and six pounds in weight, and in Europe is taken in great abundance as it ascends the streams in spring to spawn. Formerly the lamprey or "lampern" was much valued as an article of food, and even of luxury. From the time of the Romans up to the Middle Ages these fish formed a notable article in the bill of fare of the great. In the present day the taste for lampreys has greatly declined. See HAGFISH.

Lamp'ton, William James, American journalist: b. Lawrence County, Ohio. He was educated in public and private schools and at the Ohio Wesleyan University and Marietta College; edited a newspaper in Kentucky (1887-8); was reporter for the Cincinnati *Times*, writer for the Steubenville *Herald* and the Louisville *Courier-Journal*, editor of the "Merchant Traveler," Cincinnati, and has been on the staff of the "Critic" and the *Evening Star*, Washington, and of the Detroit *Free Press*. He has also been a special writer for the New York *Sun* and the New York *Herald*, and is a frequent contributor in prose and verse to magazines, his chief distinction perhaps appearing in his verses written in a vein of genial satire or burlesque. He has published "Yawps and Other Things."

Lam'son-Scribner, Frank, American botanist: b. Cambridgeport, Mass., 19 April 1851. He was graduated at the Maine State College of Agriculture in 1873; served two years as clerk to the secretary of the Maine State Board of Agriculture; and was an officer of Girard College (1876-84). In 1887 he was made chief of the Section of Vegetable Pathology in the United States Department of Agriculture, and from 1888 to 1894 was professor of botany in the University of Tennessee, and director of the agricultural experiment station there 1890-4. Since 1902 he has been chief of the Insular Bureau of Agriculture, Philippine Islands. In 1889 he received from the French minister of agriculture the cross of the Chevalier du Mérite Agricole. Among his writings published in the proceedings of various bodies, and in government reports, are: "Weeds of Maine" (1869).

LA NAVIDAD — LANCASTER

'Ornamental and Useful Plants of Maine' (1874); 'Agricultural Grasses of Central Montana' (1883); 'Revision of the North American Melicas' (1885); 'Grasses of Mountain Meadows and Deer Parks' (1889); 'Diseases of Plants' (1885-6-7); and papers on 'Grasses as Land and Soil Binders,' and on 'Grasses and Forage Plants' (1894-1900). He has also published 'The True Grass,' translated from 'Die natürlichen Pflanzenfamilien' (1890).

La Navidad, lä nä-vē-däd'. See NAVIDAD, LA.

Lancaster, läng'käs-ter, Sir James, English navigator: b. about 1550; d. London 9 June 1618. He served under Drake against the Armada, commanded the 'Edward Bonaventure' in the earliest expedition to the East Indies in 1591-4, captured Pernambuco in Brazil in 1594, and commanded the first fleet of the East India Company 1600-3. On his return home he was knighted. He was one of the original board of directors, and did much to promote the voyages of Weymouth, Hudson, and Baffin, in search of the Northwest Passage to India. The strait leading west from the north of Baffin Bay was in 1616 named Lancaster Sound by Baffin. See LANCASTER SOUND.

Lancaster, Joseph, English educator, the founder of the educational system bearing his name: b. London 25 Nov. 1778; d. New York 23 Oct. 1838. In 1798 he opened a school for children in Southwark, which he conducted on the Madras system, previously made known by Dr. Bell. (See BELL, ANDREW.) The principal features of the system were the teaching of the younger pupils by the more advanced students, called monitors, and an elaborate system of mechanical drill, by means of which these young teachers taught large numbers at the same time. He soon found powerful support, and was able to erect a school-house, which in 1805 was attended by 1,000 children. The number of his patrons and the amount of subscriptions continuing to increase, he founded a normal school for training teachers in his system. He made extensive tours through Great Britain and Ireland, and in 1811 had founded 95 schools, attended by 30,000 children. He was reckless and improvident in his habits; became bankrupt, and emigrated to America in 1818, where he at first received some support, but ultimately fell into poverty. His family subsequently removed to Mexico, where his system was very popular, and where his grandchildren, bearing the name Lancaster-Jones, became prominent politically.

Lancaster, William Joseph Cossens, "HARRY COLLINGWOOD," English civil engineer and author: b. Weymouth 23 May 1851. He entered the British navy as a midshipman, but on account of defective eyesight resigned, and became a civil engineer, in that capacity visiting different parts of the world. Under the pseudonym "Harry Collingwood," he is known to juvenile readers in England and America as the author of the popular nautical romances: 'The Secret of the Sands' (1878); 'Under the Meteor Flag' (1884); 'The Pirate Island' (1884); 'The Congo Rovers' (1885), a story of the Slave Squadron; 'The Missing Merchantman' (1888); 'The Cruise of the Esmeralda' (1894); 'An Ocean Chase' (1898); 'The Castaways' (1899).

Lancaster, Mass., town, and several villages combined, in Worcester County, on the Nashua River, and the Boston & Maine railroad; 18 miles north of Worcester. Here is the State Industrial School, a public library, numerous churches, high school, and manufactures of soap, brick, cotton goods, pumps, carriages, etc.; also large dairy and other farming interests. The town was first settled in 1651 by John Prescott, and it was here in 1676, that the Indians laid the place in ruins and killed 40 of the inhabitants. The town owns the waterworks. Pop. (1890) 2,200; (1900) 2,478.

Lancaster, N. H., town and county-seat of Coos County, on the Israel River, 126 miles north of Concord. The town is on the Boston & Maine and the Maine Central R.R.'s; and is a popular summer resort and residential section for New York and Boston people, being situated in an attractive part of the White Mountain region. It has manufactories of drugs, chemicals, lumber, wood-work, and machinery. The town owns and controls the waterworks. Pop. (1890) 3,373; (1900) 3,200.

Lancaster, N. Y., village in Erie County, on the New York Central & H. R., the Lehigh Valley, the Delaware & L. and Erie R.R.'s; 10 miles east of Buffalo. An important manufacturing centre containing iron-works, brass foundries, machine shops, glass-works, flouring-mills, brickyards, knife-works, and other industries. The waterworks plant is owned by the village. Pop. (1890) 1,600; (1900) 3,750.

Lancaster, Ohio, city and county-seat of Fairfield County; on the Hocking river and canal, and the Toledo, the Cincinnati and Muskingum Valley, and other railroads; 32 miles south of Columbus. It is the farming centre for the county; and is engaged in the manufacture of agricultural implements, foundry products, flour, glass, shoes, and has railroad shops and carbon works. It is the seat of the State Industrial School for Boys, Crawfis Institute, and the Columbia commercial school; contains a fine court-house, high school; four banks with a capital of \$125,000; and many churches; and has electric light and street railroad plants; a good water supply; daily, weekly, and monthly periodicals; and an assessed property valuation of nearly \$2,000,000. The city does an annual business amounting to \$750,000. It was first settled in 1800 by Ebenezer Zane, and is governed by a mayor and a city council of seven members elected every two years. The city owns the waterworks and gas plants. Senator John Sherman and Gen. W. T. Sherman were born here. Pop. (1890) 7,555; (1900) 8,990.

Lancaster, Pa., city and county-seat of Lancaster County, on the Pennsylvania, the Philadelphia & Reading, and other railroads; 68 miles west of Philadelphia, and 37 miles east of Harrisburg. It is the manufacturing trade centre for the county; is an important tobacco market; and is engaged in tobacco growing, cigar-making, cattle raising, and the manufacture of cotton goods, iron and steel goods, shoes, and combs. It is the seat of Franklin and Marshall College; contains the Lancaster, Saint Joseph's, and the County Hospitals, Children's Home, Mechanics' and Y. M. C. A. libraries, and Conestoga Park, and has gas and electric light plants, electric

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street railroads, 12 National and State banks having a combined capital of \$2,485,000; about 50 churches, and an assessed property valuation of over \$16,000,000. The city was founded in 1718 by Mennonites (q.v.) and was called Hickory Town until 1730. In 1777 Congress sat here for a few days, and from 1799 to 1812 it was the capital of the State. It became a borough in 1742 and a city in March 1818. It is governed by a mayor elected every two years, and by a select council of 9 members and a common council of 27 members elected annually. Here was the birthplace of General John Fulton Reynolds (q.v.), and a monument has been erected to his memory. The municipality spends upward of \$250,000 yearly in maintaining the public service. Pop. (1890) 32,011; (1900) 41,559.

H. E. KENNEDY,

Editor of the 'Morning News.'

Lancaster, S. C., town and county-seat of Lancaster County, on the Southern railroad, 84 miles north of Columbia. This is the shipping and trade centre of a large and fertile district devoted to the growing of cotton, tobacco, and grain. There are extensive cotton mills, machine shops, and other industries; public schools, two banks, and weekly newspapers. Pop. (1890) 1,094; (1900) 1,477.

Lancaster, House of, a name given in English history to designate the line of kings — Henry IV. V. and VI., immediately descended from John of Gaunt, fourth son of Edward III. Edmund, second son of Henry III., was created Earl of Lancaster and Leicester. His son Thomas added Derby and Lincoln to his titles, became leader of the baronial opposition to Edward II., and was beheaded for treason. His grandson was advanced to the dignity of a duke and, dying without male issue, the inheritance fell to his daughter Blanche, who became the wife of John of Gaunt. See also ENGLAND.

Lancaster Sound, an outlet of Baffin Bay, in lat. $74^{\circ} 20' N.$, connecting it with Barrow Strait. Though this opening into the Arctic Ocean was discovered by Baffin in 1616, it was first navigated by Parry in 1891. See LANCASTER, SIR JAMES.

Lance, a weapon consisting of a long shaft, with a sharp point, much used before the invention of firearms, and still in use. It was common among the Greeks and Romans. Frederick the Great formed an entire regiment of lancers. The Austrians followed, and soon established three regiments. After the partition of Poland, many Poles entered the French service, and a body of Polish lancers was established. The war with Russia, in which the efficiency of the lance in the hands of the Cossacks, particularly in 1812, was strikingly manifested, brought this weapon into still more repute, and the Prussians formed three regiments. The French lancers were formed in 1813 to cope with the Cossacks. Almost all the armies of Europe have had regiments of lancers. On 4 March 1903 the British War Office issued an order abolishing the use of the lance, in play as well as in work.

Lancelet See AMPHIOXUS.

Lancelot (län'sē-löt) of the Lake, a name celebrated in the traditions relating to King

Arthur or the Round Table. Lancelot was the son of Ban, king of Brucic, and after his father's death was educated by Viviana (the Lady of the Lake). She took him to the court of King Arthur, to make him one of his knights, and to admit him to the heroes of the Round Table. Arthur with his sword (*Escalibor*) dubbed him knight, and Lancelot subsequently distinguished himself by his great heroism. His love for Guinevere, the wife of Arthur, and his disregard of Morgana, a fairy, and the sister of Arthur, placed the knight in the most dangerous situations, from which, however, he always extricated himself. He finally succeeded to the throne, after having defeated King Claudas, the murderer of his father, but was slain by Mordred, the murderer of Arthur, whom Lancelot wished to punish. In his last moments Viviana appeared, and kissed the last breath from the lips of the dying hero, the sole survivor of the Round Table. His remains were deposited near those of Guinevere.

Lancet-fish. See SURGEON-FISH.

Lancewood, the wood of a West Indian tree (*Oxandra virgata*, or *Bocagea virgata*), of small or moderate size, but of great usefulness and value, possessing in a high degree the qualities of toughness and elasticity. It is well adapted for the shafts and poles of light carriages, and for all uses where light, strong, elastic timber is required. Both in strength and elasticity it is considered superior to the best ash. The name is also applied to the trees themselves, as well as to several other trees and their wood.

Lanciani, Rodolfo Amedeo, rō-dō'l'fō ä-mä'dā-ō län-chä'ē, Italian archæologist: b. Rome 1 Jan. 1847. He was educated at the College Romano and the University of Rome, and in 1878 was made professor of Roman topography in the latter. He attained celebrity by his investigations among the ruins of Rome, and is a member of many learned societies. In 1887 he gave a course of lectures at Harvard University, afterward published with the title 'Ancient Rome in the Light of Recent Discoveries' (1888). Other works of his are: 'L'Itinerario di Einsiedeln e l'Ordine di Benedetto Canonicò' (1891); 'Pagan and Christian Rome' (1892); and 'The Ruins and Excavations of Ancient Rome' (1897).

Land, in political economy. In economic theory as in social fact, land holds a peculiar position, by which the laws normal to other industrial objects are deflected. Foremost is the fact that, it being an indispensable *locus* for all industry or even social existence, its price or rental in a community where all the land is taken up is non-competitive, a monopoly which is also a *sine qua non*, as would be that of air or water; and consequently is always higher than its productive value justifies, or what is the same thing, men are content to receive a less return on their capital invested in it than in any other object. This is of course aggravated in countries where, as in England before 1832, all political privileges are annexed to it, the richest manufacturer having no vote unless he bought land and became a freeholder; less so, but still heavily, in England at present, where it and its tenantry confer great social

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and political prestige; but most of all in societies like the south of Ireland, where there is practically no industry but agriculture, and a footing on the soil at some terms is the one refuge from starvation. Farms there in former days were bid for on occasion at ten or a dozen times the gross annual produce, because there are no degrees in impossibility, and they could not in any event be deprived of a bare coarse subsistence. But the only countries in which it is on an economic level with other objects are those like America, where there has been an inexhaustible abundance of land to be had at about the cost of surveying and registering title; and here it has been the economic regulator of other prices and wages, which cannot fall below the profit of free agriculture.

The economic discussion over land in England, where freeholds are very difficult to acquire, naturally took the form of an investigation of the phenomena of Rent (q.v.); and an important part of the first economic philosophies was based on a theory of the origin and mutations of the rent charge. According to them, it could only exist where there were different grades of soils, and represented the difference in profit of farming better ones over that of farming those just sufficient to make their utilization worth while. In fact, however, even if all soils were alike, rent would still be paid for their hire if the labor and capital could produce more than the rental. Another principle early formulated, differentiating the working of land from other industries, was that of diminishing returns: it was said that labor and capital in any other field produce in exact proportion to their volume, whatever that be,—ten times the investment producing ten times the return,—whereas upon the land it is manifestly not so: extra labor produces but a small and rapidly dwindling accretion to the product, till it soon ceases to produce any. Here again there was imperfect observation: two plowings or hoeings would not produce double the crop of one, but double the outlay invested in manures or other fertilizers, loads of loam, etc., often produce very much more than a proportionate extra return. The real difference is, that in other industries the extra outlay can be applied in exactly the same channels, in land it must seek different ones.

Land in this sense refers purely to land used for raising food; where it has other uses, it is subject to the general laws of industry. Land, for instance, on which is located a water-power for manufacturing, or mineral land, if for sale, follows the usual mercantile conditions.

The subject of land belongs under Land Laws; of the single tax, under Taxation; of land nationalization, under Socialism, it being a branch of the question how far it would profit the country to place the entire social machinery under elected instead of self-determined managers; of agrarian difficulties, under the special branches of history concerned—the Roman agrarian contests, for example, shed little light on and are little illumined by the system of peasant distribution in France or the Irish land laws. For the methods followed in the United States, see LANDS, PUBLIC.

Land Banks, Massachusetts. Early in the 18th century, Massachusetts paper currency had driven abroad nearly all her coin, broken her

credit, and demoralized her business; and the failure of the Quebec expedition in 1711 carried the embarrassment to a climax. Encouraged by the success of the South Sea scheme in England, some Boston merchants induced the General Court to make the bills of credit of the province legal tender for debts of seven years previous and three years subsequent. Besides this, a number of notable men, including Peter Faneuil, devised the scheme of a bank whose resources should rest on real estate mortgages, to make loans of its own notes; to encourage subscriptions, it was proposed that Harvard College should have \$1,000 a year out of the proceeds. Gov. Dudley opposed it strongly; his son, the attorney-general, memorialized the General Court against it; and the latter forbade them even to print their scheme till they had laid it before the Court, which then refused to incorporate it. To ward it off and produce the same result, at Dudley's suggestion a public bank was founded, with a capital of \$250,000 provided by the General Court, to lend bills of credit for five years at 5 per cent, one fifth to be repaid each year, the whole secured on real estate mortgages. In 1739, with the bad state of the finances increased by the still worse state created by the paper money of Rhode Island, and silver rated at 27 to 1, the project of a land bank was again brought forward. Several hundred persons were to form it; notes were to be issued up to \$750,000, the security being a mortgage on each partner's real estate in proportion to his holding, or sureties also possessed of sufficient estate, and each partner paying 3 per cent on the loans made him, in bills or in kind, at a rate fixed by the directors. The House of Representatives was largely favorable; but Gov. Belcher denounced it as tending to fraud, disturbance of order, and confusion of business, and he set aside the election of the Speaker and nearly half the council for connection with the bank, besides displacing many office-holders. Despite this, the company began operations, expecting that the notes would circulate readily. They were mistaken: not over \$300,000 were issued. But in 1741 Parliament not only extended to the colonies an act forbidding the issue of bills not payable in coin at the end of the term, but made the directors liable to the holders of the bills for their face with interest. As a large part of them had been issued at a discount, the partners (though many had little to lose) were threatened with ruin, and Parliament had to permit relief measures. One of these partners, who lost all his property, was the father of Samuel Adams.

Land Crabs. Almost all shore-crabs will withstand exposure to the air for some hours without suffering injury, and many of them are regularly so exposed at ebb tide. It is not surprising, then, that some of them have wandered far from the seashore into the fresh-water streams and the moist woods and mountain forests, or even largely forsaken the vicinity of water and established themselves on dry hillsides. The land crabs, par excellence, belong to the family *Gecarcinidae*, in which the carapace is thick and hard, strongly arched above, rounded, bent downward and truncate in front, and vaulted in the branchial region. The branchial chamber is spacious and lined by a spongy membrane which retains moisture for a

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long time and thus keeps the gills damp. Six or seven genera and several species inhabit the warmer regions of both hemispheres. One species (*Gecarcinus ruricola*) is common on many of the West Indian islands, is excessively abundant on some of the Bahamas and occurs in southern Florida. They abound at the eastern end of Cuba, and were a source of immense annoyance to the inexperienced soldiers of the United States army in the campaign of 1898 against Santiago de Cuba. On Jamaica and the other larger islands they inhabit a zone in the hills from one to three or four miles from the shore, where they live in burrows beneath stones or under the roots of trees, from which they emerge at night to seek their chiefly vegetable food. They are large, robust creatures with extremely powerful claws, which a pugnacious disposition leads them to use freely. Mating takes place in the spring, and during the rainy season in May a common impulse causes them to migrate in vast armies to the sea, where they bathe and deposit their eggs, which are washed up and buried in the sand by the waves. There is no metamorphosis, but the young develop directly and hatch in nearly the adult form. By resident naturalists and travelers who have observed it, this animal's march to the sea is described as a most impressive sight. Most of the males form an advance guard which is followed in two or three days by the females and remaining males. They are said to proceed in a direct line and to climb over, instead of passing around, every obstacle, even houses. After discharging the eggs, bathing, and resting, the crabs return to the hills and in midsummer close their burrows with leaves, grass, etc., and retire to their inmost recesses to moult. At this time, while in the soft-shelled state, they are in high favor for the table, and are dug out of their burrows in large numbers by the natives. A related species (*Ucauna*), the Brazilian mangrove-crab, is remarkable for the regular inspiratory and expiratory changes of the air in the branchial chamber.

The *Thelphusidae* are river crabs rather than land crabs, but a number of species inhabit the damp forests of warm countries. In Japan a well-known species (*Thelphusa dehaanii*) is frequently met with in the mountains at an elevation above 2,000 feet. Some terrestrial species are mentioned in the article HERMIT CRAB.

Consult: Brown, 'Civil and Natural History of Jamaica'; Young, 'West Indian Stalk-eyed Crustacea'; and Rathbun, 'Proceedings of the U. S. National Museum' (1899).

Land Grant, a concession or subsidy made by the United States Congress to assist railroad companies to secure funds, by the sale of bonds secured by lands so granted, to construct lines of railway through parts of the United States where the local traffic would not pay the running expenses. About 215,000,000 acres of land were given to the various railroads of the country by the government. The Illinois Central received a strip of land 12 miles wide, running the whole length of Illinois; the Northern Pacific received 47,000,000 acres; the Atlantic and Pacific, 42,000,000; the Union Pacific, 13,000,000, and other roads in proportion.

Land League, an Irish organization founded by Charles S. Parnell, which came into

being at a meeting held in Dublin 18 Nov. 1879. The principal tenets of the association were the "three F's"—fixity of tenure, fair rent, and free sale (of the tenant's interest): but many speakers at Land League meetings, held in different parts of the country, went so far as to demand that the soil should belong to the cultivator. Opposition by direct violence was deprecated, and recourse was had to boycotting. (See BOYCOTT.) This state of things continued till the end of 1880, when 14 members of the Land League, of whom the most important were Parnell, Dillon, Biggar, T. D. Sullivan, and T. Sexton, were indicted. The chief counts were "conspiring to prevent payment of rents, to defeat the legal process for the enforcement of payment of rents, and to prevent the letting of evicted farms." The trial, which took place early in 1881, was a fiasco, but it drew from Justice Fitzgerald the declaration that the Land League was an illegal body. A Ladies' Land League, under the presidency of Miss Anna Parnell, was then formed. It was denounced by Archbishop McCabe, and warmly defended by Dr. Croke, archbishop of Cashel, and T. D. Sullivan. The agitation increased, and the "No Rent" cry became more frequent. Gladstone denounced Parnell, and soon afterward Parnell, Dillon, Sexton, O'Kelly, and the chief officials of the League, were arrested and imprisoned in Kilmainham. They issued a manifesto calling on the Irish tenants to pay no rent during their imprisonment. The government replied by declaring the Land League an illegal body, and suppressed its branches throughout the country. The Ladies' Land League continued until the close of the year, when it was dissolved by the leaders of the Irish party. See IRELAND.

Land-locked Salmon, a salmon which inhabits an inland body of water, and can never go and come to the sea. The term applies in America only to salmon inhabiting certain lakes in eastern Canada and northern New England; and whether these salmon should be regarded as distinct species or merely as representatives of the Atlantic salmon modified to suit their local conditions, is a question upon which ichthyologists are not agreed. It is most convenient to follow the distinctions made by sportsmen, and regard the land-locked salmon as two species, the Sebago salmon and the ouananiche (qq.v.).

Land Office, United States, the department charged with the management and disposal of the public lands. For its constitution and history, see LANDS, PUBLIC.

Land-snail, an air-breathing terrestrial gasteropod mollusk, or snail of the family *Helicidae* or some nearly related pulmonate. These mollusks possess a well-developed, usually globose and more or less spiral, horny and brightly colored shell (except in slugs, q.v.), into which the whole animal may be withdrawn, and which has, usually, a lunate aperture, not closed by an operculum. Four retractile tentacles exist, the upper pair being the larger and possessing eyes at their tips. A distinctly developed so-called "foot" is present. The aperture by means of which air is admitted to the lung-chamber for the purpose of breathing exists on the right side, under the edge of the shell. The mouth possesses an upper mandible

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of horny consistence and toothed structure, and, as in other gasteropods, there is a tongue or lingual ribbon bearing many teeth. The food is generally of a vegetable nature, and snails are capable of doing great mischief in gardens, but none in the United States is noticeably harmful. The sexes are united in the same individual; but the copulation of two such hermaphrodite individuals is necessary for impregnation, which becomes mutual. The eggs are globular or oval, have coriaceous shells, and are laid singly in damp places, as under leaves, stones, etc.; *Bulimus* (q.v.) is noted for the comparatively large size of its eggs. These eggs and the snails themselves are eaten by birds, turtles and other enemies, especially in the tropics, where land-snails are more varied, numerous and conspicuous than in temperate regions. Some species, however, live in very cold climates, far to the north or high on mountain ranges. Those of cold climates hibernate in winter, creeping into sheltered places, and closing the aperture with one or more air-tight drum-head-like curtains of hardened mucus. In hot and dry places they protect themselves in midsummer against undue loss of moisture in the same manner.

The family *Helicidae*, which embraces not only the terrestrial genus *Helix*, but the bush-climbing, long-spined *Bulimus* (q.v.), and several smaller genera, includes thousands of species. Specimens are always most numerous in moist woods and in a limestone region than elsewhere. Many small terrestrial mollusks, properly called land-snails, belong to families other than *Helicidae*, as the *Orthalicidae*, *Bulimulidae*, and *Pupidae*, the last containing many minute American species, not larger than a pin-head, shaped like a grain of rice, and beautifully chased; *Stenogyridae*, in which are found the great agate-shells (*Achatina*) and sundry others of the tropics; *Succineidae*, represented by many small, glassy expanded forms of great beauty; and others, some of which contain shell-less and slug-like forms.

Utility of Snails.—Snails have been made of use medicinally in the past, and curative virtues are still attributed to them among European peasants. Among the Romans snails were held in high esteem as articles of food and even of luxury; and special parks or establishments named "cochlearia" were constructed for the purpose of fattening these mollusks. The practice of eating snails has never been very common in England, but Howard, the prison philanthropist, tried to encourage it. Howard cultivated the *H. varronis*, the largest of European species. In modern Europe, as in many parts of France, and in Vienna, especially during Lent, snails are largely consumed, especially among the lower orders. The proletarians of Naples are exceedingly fond of a soup made from *H. nemoralis*. The most valued species among modern epicures is the *H. vermiculata* or little hermit snail, found at Montpellier; and *H. aspersa*, the "garden-snail" of the English, is also regarded as very delicate when properly cooked. *H. pomatia* has a wider range as an edible snail, especially in France, where this species is extensively cultivated for market in appropriate enclosures called *escargotières*; thousands are also gathered from the vineyards and sold in the larger towns of southern France. It is im-

ported in pickle to the United States, and finds extensive sale.

Bibliography.—Consult: Lovell, 'British Edible Mollusks'; Cooke, 'Mollusks' (Vol. III. Cambridge Natural History, 1895); Binney and Bland, 'Land and Fresh-water Shells of North America.'

Land of Steady Habits, a phrase applied to the State of Connecticut.

Land Surveying. See SURVEYING.

Land-tortoise, a terrestrial turtle of the family *Testudinidae*, order *Cryptodira* (see CHELONIA), a family characterized primarily by the possession of a strong box-like shell, completely ossified when young and covered with horny shields, into which the whole body may be withdrawn and in some forms wholly enclosed. The family also contains aquatic and amphibious forms (see POND-TURTLES; TERRAPIN), but these need not now be considered. American representatives are found in the box-turtles (properly so-called) of the genus *Cistudo*, in which the plastron is connected with the carapace by ligaments and is divided into two movable lobes, the transverse hinge being so perfect that the box can be completely closed after head, legs and tail have been withdrawn. The carapace is high and arched. The common box-tortoise of the United States (*C. carolina*) has become completely terrestrial, and has undergone some interesting structural modifications in consequence, among others a loss of webbing between the toes. It reaches about six inches in length, is highly variable in the arrangement of the blackish and reddish tints of its coloration, and each dorsal shield is nicely sculptured in concentric rings, but these become worn nearly smooth in old age. They wander about the woods, walking with the shell well lifted from the ground, and searching for food most diligently in the evening and early morning and in moderate and moist weather. Their food consists chiefly of snails, slugs, earthworms, crayfish, grubs, and the like, together with fungi and a little green stuff. In winter they hibernate, buried in soil or garden rubbish. They are fond of staying in one limited district, are easily tamed and exhibit some intelligence, but individuals differ much in these respects.

The typical land-tortoises, however, are those of the genus *Testudo*, in which the plastron has no hinged, folding part, and the feet are short and webless. The 40 or more species are scattered throughout the warmer parts of the world, excepting in Australasia. The small, convex, highly sculptured "Greek" tortoises of Europe and North Africa, so often kept as garden pets, are familiar representatives. They feed almost wholly upon green grass, leaves and vegetables. The captive made famous in Gilbert White's 'Natural History of Selborne' was one of these (*T. ibera*), and its shell is now preserved in the British National Museum. The gopher tortoise (q.v.) of Florida is a North American species; and a similar widely spread South American species (*T. tabulata*), which lives mainly on forest fruits, is often two feet long.

Gigantic Land Tortoises.—Certain terrestrial tortoises of very large size survived until the historic age, and in some cases still exist, on islands in the Indian and Pacific oceans. They are relics of a bygone period, when even larger

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ones prevailed. Fossil bones in Miocene and Pliocene strata of India, western North America and other parts of the world, indicate tortoises of that period whose heads alone must in life have been nearly a foot in length, and beside those giants even the largest of the modern species so-called would look small. The presence of such turtles gave their name to the Galapagos (q.v.) group of islands off the coast of Ecuador, where each of the large islands of the archipelago supported a separate species, but all resembled one another in the relative small size of the head and great length of the neck. "The most peculiar looking are or were *T. ephippium* and *T. abingdoni*, the shell of which is extremely thin, with large lacunae in the osseous plates. The profile of the shell is saddle-shaped, with the horny shields partly concave and turned upward at the sides. The general color of these and other Galapagos tortoises is black." Toward the close of the 19th century all that remained of these tortoises were caught and distributed alive to various parks and zoological collections in North America and Europe, where they will be cared for and will probably continue their race. They eat grass and leaves of succulent plants, as lettuce; their food in the Galapagos having been mainly cactus and a lichen (*Usnea*).

Other giant tortoises inhabited the islands of the Indian Ocean until within the historic period, and a few remain in captivity. In 1808 there was still living in England a specimen of *T. sumeiri*, once existing in thousands on the Seychelles, whose history was known since 1766, when it was already of large size. Other species inhabited Madagascar, where they became extinct prehistorically, Bourbon, Mauritius and Rodriguez. They were utilized as food by the voyagers of the 17th and 18th centuries; were wastefully slaughtered by the European colonists, and carried in shiploads from island to island, until at last none remain but a few captive specimens.

Consult: Günther, 'Gigantic Land Tortoises' (1877); Gadow, 'Amphibia and Reptiles' (1901); Baur, 'American Naturalist,' Vol. XXIII. (December 1889).

Lande (Fr. *länd*), in France, a name given to a sandy plain unsuited for bearing grain. From the vast extent of landes (about four fifths of the total area) which it contains, the third department of France, in point of size, derives its name. The landes lie to the north of the Adour, while the country to the south of that river is fertile. Of the whole area (about 2,250,000 acres), nearly one half is waste, a third under wood, and little more than a sixth arable. The landes are very thinly populated, the inhabitants gaining subsistence by fishing, by such agriculture as is possible, and by keeping cows and sheep. The shepherds make use of stilts, that their increased height may give them a greater range of vision, and, when fatigued, sit on a pole with a head somewhat like that of a crutch, and while away the time in knitting.

Lan'der, Frederick West, American military officer: b. Salem, Mass., 17 Dec. 1821; d. Paw Paw, Va., 2 March 1862. He was educated at the Norwich (Vt.) Military Institute, and became a civil engineer. He was employed in making surveys across the continent by the

United States government for the purpose of finding a suitable route for a transcontinental railroad and served in the Army of the Potomac in the early part of the Civil War.

Lander, Jean Margaret (Davenport), American actress: b. Wolverhampton, England, 3 May 1829; d. August 1903. Her stage career began in childhood, and her parents brought her to this country in 1838, where she played for four years, then traveled in Europe (1842-8), playing as Julia in 'The Hunchback' in England and on the Continent, returning to the United States in 1849. She acted with great success in the principal cities until 1860, when she married Gen. Frederick West Lander (q.v.) and retired from the stage. After his death in the Union army in 1862, Mrs. Lander joined the Hospital Corps of the army, and for more than a year she and her mother were in charge of the hospital at Port Royal, S. C. After the War she returned to the stage and again enjoyed great popularity in a number of important roles, some of which she originated in this country. Her final appearance was made in Boston in 1877, in an adaptation of 'The Scarlet Letter.'

Lander, Louisa, American sculptor: b. Salem, Mass., 1 Sept. 1826. In early youth she manifested her taste for sculpture by modeling heads for dolls, and carving bas-reliefs on alabaster and other soft substances. As she grew older she modeled likenesses of members of her family, and executed cameo heads. She went to Rome in 1855 and became the pupil of Crawford, and soon after finished in marble 'To-day,' a youthful figure emblematic of America, and 'Galatea.' Among her subsequent works are: a bust of Hawthorne; a spirited statuette of Virginia Dare, the first English child born in America; a life-size statue of Virginia; a reclining statue of Evangeline; 'Elizabeth, the Exile of Siberia'; a statuette of Undine, and one of 'Ceres Mourning for Proserpine'; numerous portrait busts; 'A Sylph Alighting'; and 'The Captive Pioneer.' She was a sister of F. W. Lander (q.v.).

Lander, Richard, English African explorer: b. Truro 8 Feb. 1804; d. Fernando Po 6 Feb. 1834. He became a domestic servant; in that capacity accompanied Captain Hugh Clapperton as his servant on his second expedition into the interior of Africa 1825. After Clapperton's death in 1827 he returned to the coast, and in 1829 published 'Records of Captain Clapperton's Last Expedition to Africa.' In the spring of 1830 he set out with his brother John on an exploring expedition, under the auspices of the English government, and from Badagry, near Cape Coast Castle, they proceeded to Boossa on the Niger, and after ascending the river for about 100 miles, traced its course downward to the sea, and proved that it entered the Bight of Benin by several mouths. They were the first also to discover that it was fed by the Benue. Their journal was published in 1832, entitled 'Journal of an Expedition to Explore the Course and Termination of the Niger,' and was translated into several languages. While on a trading expedition in the delta of the Niger, he was wounded by the natives, and died soon after.

LANDGRAVE—LANDON

Land'grave (German *Landgraf*), a title assumed by certain territorial counts of the German empire to distinguish them from the inferior counts. There were originally three landgraves, those of Thuringia, and of Upper and Lower Alsace, who were princes of the empire. The title was assumed by Louis III. of Thuringia about 1130.

Landlord and Tenant, the relation of renter to rentee; not necessarily of land, except as all dwellings or industries must have land for a *locus* (see LAND, IN POLITICAL ECONOMY), but of any of its material incumbrances. The landlord need not be the owner: he may himself be a lessee or tenant granting occupancy or use to a sub-tenant. It is sufficient that his title is superior to that of the one who holds through him. The difference between the latter's interest and that of the landlord is known as the reversion of the latter; but there is obviously no reversionary interest unless the grant is specifically limited to a less volume than the grantor's, and none unless it is inferior in kind. Historically, the relation originated in the practice of inféudation in the Middle Ages, when all holdings were a chain of vassalships, when even kings did homage for portions of their possessions, and no property was held by any but kings, except as vassal to some overlord. The feudal incidents were abolished by the English statute of Quia Emptores in 1290. The modern mercantile relation of lessors and lessees is the creation of statute, judicial decisions, and the specific agreements of written contracts.

The mutual obligations of the contracting parties in law are natural consequences of the relation. The landlord on his part must protect the tenant from any other claim of occupancy; must not evict him or suffer him to be evicted, and if he does either, is liable in damages. He is not, however, under any obligation to protect him against violence, trespass, nuisances, or other unlawful acts of outsiders; nor to furnish habitable buildings, usable implements, or anything whatever of specific quality unless specially agreed on. The doctrine of *caveat emptor* is also extended to *caveat lessor*; he must form his own conclusions and run his own risks. The tenant cannot question or interfere with the landlord's title, even if the latter be worthless: his own is derived from it, and must stand or fall with it. Nor does any length of occupancy enable him to plead the latter in bar of the landlord's right, by the statute of limitations, under common law; but he very generally can by statute after a certain period, though never till the period of his tenancy has expired. Of old the feudal tenant could do at once much more and much less than this: he could not under any circumstances get the landlord's property into his own hands, but by a legal fiction of which the law sanctioned the use (feoffment or common recovery), he could grant to a third party what he did not himself own, so that the third party could retain it; the wrongful grantor, however, forfeited his own estate to the landlord. Statutes long since abolished these fraudulent conveyances.

The tenant must keep the premises in repair; if he lets them go to ruin or deteriorate from non-use he is liable in damages. By common

law he must rebuild premises destroyed by fire; most States of the Union abrogate this right, however. The tenant must not commit waste; but he may cut wood for fire, repairs, or fencing, and if he is a tenant at will or for life he has a right to the crops.

Obligations by agreement may of course be almost anything. Stipulation of rent usually forms a part; permission to make improvements not to be removed is most usual, sometimes obligation to make them of certain sorts; and an agreement not to assign the lease without the landlord's permission. The landlord may agree to renew the lease or to pay for improvements, or permit removal of fixtures, etc. An agreement to pay a reasonable rent has been held to be implied without being specified in the lease. All such rights and duties extend to the successors to the parties, including assignees.

Landois, läñ-dwá, Hermann, German zoologist: b. Münster, Germany, 19 April 1835. He studied for the priesthood, but in 1859 turned his attention to science, and in 1873 was appointed professor of zoology at the Academy of Münster. He is the author of 'Sound and Voice Apparatus of Insects' (1867); 'Text-Book of Zoology' (1870); 'Text-Book of Botany' (1872); 'Voices of Animals' (1875); 'Text-Book of Instruction in the Description of Nature'; and other popular works of a like character.

Landois, Leonard Christian Clemens, German physiologist: b. Münster, Germany, 1 Dec. 1837. He is a brother of H. Landois (q.v.), and was educated at the University of Greifswald and has been professor of physiology there from 1872. He is widely known as an original investigator and has published: 'Le Diagnostique des Maladies des Yeux' (1877); 'Manuel d'Ophthalmoscopie' (1878); 'Traité complet d'Ophthalmologie' (1886); 'Lehrbuch der Physiologie' (10th ed. 1899); etc.

Land'on, Letitia Elizabeth, English poet, better known by her initial signature "L. E. L.": b. Chelsea, England, 14 Aug. 1802; d. Cape Coast Castle, Africa, 15 Oct. 1838. She wrote much for the then fashionable annuals, and was long popular both as poet and prose writer. In June 1838 she was married to a Mr. George MacLean, and sailed with him to Cape Coast Castle in Western Africa, where he was governor. She died there soon after her arrival, from an accidental over-dose of prussic acid, which she had been in the habit of using medicinally. Her chief works are: 'The Improvisatrice and Other Poems' (1821); 'The Golden Violet' (1827); 'The Venetian Bracelet' (1829); 'Ethel Churchill,' a novel (1831); and 'Romance and Reality,' a novel (1837).

Landon, Melville de Lancey ("ELI PERKINS"), American author: b. Eaton, N. Y., 7 Sept. 1839. He was graduated at Union College in 1861, and soon after joined the Union army, from which he retired in 1864, having reached the rank of major. He became a cotton-planter in Arkansas and Louisiana, traveled in Europe, and was for a time secretary of the United States legation at St. Petersburg. His writings have made him known chiefly as a humorist, but have dealt with serious as well as lighter subjects. He has published: 'Saratoga in 1901' (1870); 'History of the Franco-Prus-

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sian War' (1871); 'Wit, Humor and Pathos' (1875); 'Wit and Humor of the Age' (1880); 'Kings of Platform and Pulpit' (1887); 'Thirty Years of Wit' (1890); 'Eli Perkins on Money—Gold, Silver or Bimetallism' (1895); and other works.

Lan'dor, A. Henry Savage, English traveler and painter: b. Florence, Italy. He is a grandson of Walter Savage Landor (q.v.), and has traveled in eastern Asia, America, Australia and Africa. Among his writings are 'Alone with the Hairy Ainu'; 'Corea, or the Land of the Morning Calm'; 'A Journey to the Sacred Mountains of Siao-on-tai-shan'; 'China and the Allies' (1901).

Landor, Walter Savage, English poet and prose writer: b. Ipsley Court, Warwickshire, 30 Jan. 1775; d. Florence, Italy, 17 Sept. 1864. He was educated at Rugby and Oxford, from the latter of which he was rusticated in 1793 for breach of discipline and never returned. He published a small volume of poems in 1795, and a long poem, 'Gebir,' in 1798. This latter he subsequently translated into Latin verse, being one of the most accomplished Latinists of his time. He succeeded to a large property on the death of his father, but sold it off, determining to live abroad. In 1808 he raised a body of men at his own expense for the defense of Spain against France. In 1811 he married and settled at Florence, where many of his works were written. Having separated from his wife he returned to England in 1835. In 1858 he went back to Italy, which henceforth remained his home. His fame chiefly rests on his 'Imaginary Conversations' between celebrated persons of ancient and modern times, which is a model of a pure, vigorous, finished English style. Among his other works are: 'Count Julian,' a tragedy (1812); 'Hellenics' (1847); 'Pericles and Aspasia,' imaginary letters (1836); 'Pentameron and Pentalogue' (1837); and the dramas 'Andrea of Hungary' and 'Giovanna of Naples.' Consult Life by Forster (1871); Colvin, 'Landor' (1881).

Land'rail. See CORNCRAKE.

Lan'dreth, Burnet, American agriculturist: b. Philadelphia 30 Dec. 1842. He was educated at the Polytechnic College, Philadelphia, was captain of infantry during the Civil War, serving in the Army of the Potomac, and since the war period has devoted himself to the promotion of higher agricultural and allied interests in many important fields of service. He was chief of the Bureau of Agriculture at the Centennial Exhibition, director-in-chief of the American Exhibition in London, and is a member of many American scientific societies; also holds honorary membership in similar bodies in European countries, in India, and in Japan; and is Chevalier and Officier du Mérite Agricole de France. He founded and is president of the Association of Centenary Firms of the United States, and is head of the seed-house of D. Landreth & Sons, established in 1784 in Philadelphia. He has published several works on agricultural subjects.

Landry, Auguste Charles Philippe Robert, Canadian author and statesman: b. Quebec 15 Jan. 1846. He was graduated from Laval University in 1866; then took a course in agricultural science at the College of Sainte Anne, and

devoted himself to farming. He served for several years in the militia, rising to the rank of lieutenant-colonel. In politics he is allied with the Conservatives; he was a member of the Quebec Assembly 1875-6; was elected to the Canadian House of Commons in 1878, where he served till 1887, when he was defeated at the general election; in 1892 he was called to the Senate. He became president of the Quebec Exhibition Company in 1894, is a member of several agricultural societies, and was elected president of the Council of Agriculture in 1896. He has written 'Traité populaire d'Agriculture théorique et pratique' (1878); 'L'Eglise et l'Etat' (1883); and numerous papers on political and scientific subjects.

Lands, Public. The subject may be divided into five sections: (1) The acquirement of the lands by the nation; (2) the objects and methods of disposal; (3) the manner of acquirement by individuals; (4) the government system of management; (5) general statistics.

1. The 13 States as finally delimited contained 341,752 square miles, increased by the treaty of peace with Great Britain to 830,000. Their Western lands *in posse* were ceded to the general government as a common possession and trust fund, first by New York to remove obstacles to the formation of the Confederation (q.v.); then by the rest of the northern States and Virginia before the adoption of the Constitution; the others gradually followed, Georgia coming last in 1802. It was understood, and is implied in the Constitution, that this was eventually to be erected into States; but meantime Congress must decide on their disposal to the settlers who were ultimately to form those States, and could reserve as *enclaves* within the States whatever tracts it chose. The Ordinance of 1787 (q.v.) is a monument to its action in administering the territory north of the Ohio. For the further accessions to our territory, see ANNEXATION. But after these State or treaty cessions, there still remained Indian claims to vast tracts, which could only be quieted by purchase or war, and in fact required much of both. Great tracts were bought, and the Indians who refused to remove from the remainder east of the Mississippi were gradually deported beyond it. (See INDIAN TERRITORY; and for the most extreme case of forcing a removal, CHEROKEES and CHEROKEE CASE.) The reservations have embraced in all more than 100,000,000 acres, but have themselves later been largely thrown open to settlement, by purchase from the Indians.

2. The first thought in handling the public lands was revenue: "to effect a gradual discharge of the domestic debt, and furnish liberal tributes to the federal treasury" ('Federalist'). As the country grew richer this policy was abandoned, and two others took its place,—to induce settlement of the territory, and to provide funds for public uses where general taxation would have been unpopular or perhaps unconstitutional. The latter have included grants to private individuals for eminent public services, to educational and charitable institutions direct and to States for them, to public improvements like roads, canals, and railroads, and to States for them (the latter first), and lately for a giant irrigation fund.

The first policy naturally led to its being sold to syndicates in vast tracts; the price, at

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first fixed at a minimum of \$1 per acre, was reduced to 66 $\frac{2}{3}$ cents, and two great sales were made in Ohio, to a New England and a New Jersey company. The second resulted in Cincinnati, but its 1,000,000 acres conflicted with Indian and military reservations, and only 310,000 acres were actually sold. This policy aroused great discussion: some claimed that the land should be sold to settlers in such lots as they wished; others declared that if so done the Eastern States would be depopulated,—the States were already bidding against each other to sell their own lands. Massachusetts offered Maine lands at 50 cents an acre to check western emigration, and the Illinois Spaniards offered theirs for nothing with a temporary exemption from taxation, and stocked at that. Hamilton made a classic report in 1790, the basis of an important part of the present system, and in 1796 Congress voted to sell the lands in quantities a mile square at \$2 an acre. Up to 1801 the total sales were 1,484,047 acres, all in Ohio. But the sales were so slow at the last that in 1799 nothing was turned into the treasury from this source, and in 1800 only \$443. In May 1800 a credit system was introduced, one fourth down and the rest in three years. The result was a great increase in sales, but also in so much chance speculation that a large part of the payments were defaulted. Congress disliked to oust the settlers, and relief acts were regularly passed for many years. In April 1820 the credit system was abolished, and lands sold for cash in lots as small as 80 acres, at \$1.25 per acre. The debts still owed were over \$21,000,000 in December 1820; they were not wholly discharged—partly through payment for arrears and more by relinquishment of lands—till 1830. Under the new system, by 1840 the sales had been some 76,000,000 acres. After the panic of 1837 the pre-emption system (see Section 3) was introduced, with a bitter fight,—as it was thought to encourage speculators, intruders, and squatters, who would not pay until forced,—and for some years it was confined to special licenses which were really relief acts for previous settlers. In September 1841 a permanent pre-emption act was passed, supplemented by the act of 5 March 1843. This was confined to surveyed lands; in 1853-4 it was extended to unsurveyed ones, so that intending settlers could take their choice of the best lands everywhere. In 1854 a Graduation Act (q.v.) was passed, to sell off cheaply lands which had been long in the market. From 1852 on a homestead law was one of the platform issues; first to grant 160 acres free to any settler, then to charge 25 cents an acre after five years, finally passed in 1862 substantially as at present,—five years' continuous residence and improvement on a quarter-section, and then a free patent. The results of this policy are given in the final paragraph. The pre-emption law has recently been repealed on account of the shameless collusive frauds on the government. In 1878 a Timber Culture Act was passed, granting not exceeding 160 acres to any one proving that he had planted 150 acres of timber; this, too, has been repealed.

Of the gifts, the chief personal ones were in bounties to the Revolutionary soldiers and to those of the War of 1812, and to a few individuals like Lafayette. After the Mexican War, some 60,000,000 acres was given in bounties to

soldiers and officers. Grants were also made to those who would take land on specified frontiers, to form a buffer settlement. The grants for public improvements have been lavish. The first were wagon roads; then came canals, for which over 4,000,000 acres were granted in five States between 1824 and 1866; then by act of 1850, all swamp and overflowed lands within the bounds of any State were granted it as a fund to construct dikes and drainage. The first railroad grant was made to Illinois in 1850 to construct the Illinois Central Railroad; as ever since, alternate sections of land on each side were given. Several scores of others have been given to other States. The greatest gift of the sort, however, was for the construction of the Union Pacific Railroad, which had to be given direct because the lands for many hundred miles were in districts where no States had arisen. (See CREDIT MOBILIERS OF AMERICA.) About 155,000,000 acres were granted in all, but some reverted to the government for failure to fulfil conditions. The educational gifts have been great: the States admitted previous to 1850 had 1-36 of their area reserved for a school fund, those since then 1-18, some 70,000,000 acres altogether; in 1862 each State had a tract proportional to population for an agricultural college—about 10,000,000 acres; each of the last six States has been granted a tract for a university, over 1,000,000 acres in all, with other gifts for education, public buildings, etc., amounting to 25,000,000 acres in all. Finally, in 1902 the entire receipts from the sale of lands in 17 States and Territories were set aside as an irrigation fund, calculated ultimately to produce several hundred million dollars.

3. There are several methods by which private entry has been made on public lands. The pre-emption law, recently repealed on account of fraud, allowed any one to receive a full title to 160 acres of land after six months' residence and improvement, on paying \$1.25 an acre; there were several exceptions to the lands that might be taken, and no one who already owned 320 acres, or who deserted his own land to take up the new, was entitled to the privilege. Despite this, it has been a huge engine of fraud: its excuse being that it was for many years the only way in which the unoccupied lands could be settled up. Less rapidity of settlement might not have been injurious. The Homestead Acts (q.v.), five years' residence and no payment, made the same exceptions of land and persons, otherwise both were the same as under the former system. This affords far less chance of fraud, and is the one system now in use. Another method is to announce a public auction to the highest bidder at \$1.25 an acre, the unsold part being retained for private sale. Military land warrants to soldiers or their families are another method. The Timber Culture Act, now repealed, has been mentioned.

4. The General Land Office classifies its lands in seven divisions: (1) Agricultural lands. These are rated either as "double minimum," within a specified distance of works of internal improvements, and sold at \$2.50 an acre; or minimum, at \$1.25 an acre. (2) Town sites: either sold at public auction for \$10 an acre, or inhabitants of cities or towns granted the privilege of entry at \$1.25. (3) Mineral lands, varying from placer locations at \$2.50 an acre to

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mining rights at \$5; not to exceed 1,500 x 600 feet, nor go below 1,500 x 50, thus varying from 20.66 to 1.72 acres. (4) Timber and stone, unfit for cultivation, 160 acres limit, \$2.50 an acre. (5) Saline, containing salt springs; offered first at public auction for \$1.25 an acre, then held for private sale at the same price. (6) Coal, limit of 160 acres to a person and 320 to a company, save that the latter (if at least four persons) on expending \$5,000 can enter 640 acres more; \$10 an acre if over 15 miles from a railroad, \$20 if less. (7) Desert, limit 640 acres, price 25 cents on entry, with an affidavit of intending to irrigate it within three years; which done, \$1 an acre more secures a full title.

The method of survey is the rectangular system, devised by Jefferson; under which an immigrant can travel a thousand or two thousand miles into a new territory and find his farm without delay or doubt. It was adopted in 1785; the township of six miles square and the section of one mile were Monroe's suggestion. A base line and meridian line are first determined; and from the former, townships of the above size are established, and numbered north and south. From the meridians chosen, ranges a mile square are charted, and numbered east and west of the principal meridian. Thus, "Northeast quarter of Section 11, Township 17 south, Range 3 west of the fourth principal meridian," can be reached at once; and boundary marks being always placed at the intersection of divisional lines, the special farm can be determined without trouble. The first principal meridian established was that dividing Ohio and Indiana, with the Ohio River as its base, and the meridian 82° 51' west. This controls surveys in Ohio. Since 1785, 24 initial points (intersection of principal bases with surveying meridians) have been used.

These lands are under control of the General Land Office at Washington; a bureau first established in the Treasury Department 25 April 1812, placed under presidential control in 1836, and transferred to the Interior Department on its organization in 1849. The head is the commissioner. It issues and records all government land patents, whether on private claims, congressional grants, or any other ground; there are three chief clerks (of surveys, of public lands, and of private claims), a presidential secretary to sign land patents and affix the official seal (a duty formerly discharged by the President), and a recorder to countersign them,—all appointed by the President and confirmed by the Senate. The commissioner makes annual report to Congress; and the office issues maps showing government reservations and unappropriated lands, circulars of information, etc., besides auditing all accounts relating to these lands. The commissioner and all employees of the office are forbidden to deal in the public lands directly or indirectly. There is also a State land office established in each State with more than 100,000 acres of unsold lands, each having a register and a receiver appointed by the President for four years; the former receives applications and issues patents, the latter receives and collects for the money. In 1902 there were 115 district land offices, and 17 surveyors-general.

5. In 1902 (June 30) the total amount of public domain lands from the first had been 1,809,539.846 acres (2,827,406 square miles). Of this, the amount now surveyed and ready for sale was

301,979.307, unsurveyed and unappropriated in Alaska 367,983.506, outside of Alaska 223,992.663; reserved, 151,161.638; appropriated, 704,422.726. Of course a very large part of these unsurveyed lands are mountain or moor, permanently unavailable; but a great quantity is still left worth appropriating. How rapidly this is being taken up will be shown by the following table of operations at the General Land Office for the past five years (year ending 30 June):

	No. original Homestead Entries.	No. acres sold.	Cash sales.
1898.....	44,980	8,453,896.92	\$2,277,995.18
1899.....	45,776	9,182,413.16	3,070,137.34
1900.....	61,270	13,453,887.96	4,379,758.10
1901.....	68,648	15,562,796.30	4,972,160.79
1902.....	98,829	19,488,535.30	6,261,927.18
Total.....	319,503	66,141,529.04	\$21,251,744.98

In other words, of the lands outside Alaska, an amount equal to over $\frac{1}{8}$ was taken up in five years, and 1-27 in a single year. In 1902 there were also given in grants to railroad roads and wagon roads 5,008,131.66 acres. It is evident that in a very few years the last acre of cultivable land will have been disposed of. This process is accelerated by bogus claims used by ranchmen to fence in great quantities of land for grazing purposes, which it is almost impossible for the government fully to suppress. Of the sales, the chief amounts were in Montana, South Dakota, Idaho, Utah, Nevada, and Minnesota, in order of amounts—of course in Utah and Nevada largely for mineral lands.

Land's End, England, a headland in Cornwall, about 60 feet in height, consisting of granite cliffs, and forming the western extremity of England. There is a lighthouse on the rocks, called Longships, about a mile to the west. Here is the entrance to the English Channel from the Atlantic Ocean.

Landscape Gardening — otherwise, as sometimes called, landscape architecture — is a decorative art that so selects and arranges buildings, roads, paths, lawns, trees, and shrubs as to render beautiful the areas needed around houses and within cities and towns. In this reference the term tree means a woody plant with a single trunk, and the term shrub means woody plant with many trunks. The Roman, and subsequently the Italian, villa was supplemented by a garden into which the architectural and sculptural elements of the villa were freely extended. Terraces with stone foundations and balustrades lead down broad stairways to flower gardens disposed in geometric pattern and frequently accompanied by fountains with stone curb and ornate centrepiece. Casino, grotto, pergola, arch, vase, and even statues increased this formal character; and in consistency therewith the trees, shrubs and hedges were pruned or clipped, and sometimes trimmed into geometric shapes, thus making the so-called topiary work. This formal or architectural style was followed, along with other elements of Italian culture, by the French, until in the 17th century Lenôtre gave it a broader treatment more suited to a level country and peaceful conditions. This formal style prevailed also

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in England until in the same century a naturalistic style arose which has ever since formed the counterpart and rival to the formal style. It discards the statue, reduces architecture to indispensable bridge and shelter, conceals roads and paths, displaces the terrace by the lawn, and the exotic pattern bedding or the flower bed by the flower border. The herbaceous perennials proper to this style are not eclipsed in beauty or fragrance by their exotic rivals; and, with shrubs and trees, they are freed from the shears to attain their full growth. Shrubs and climbers bind house to earth, and furnish boundaries to the grounds, while flowers range in front of them, or are relegated to a separate section. This naturalistic style has spread throughout northern Europe and the United States, being here the favorite with the late F. L. Olmsted (q.v.) in broad, restful effects produced in many city parks of the land.

The city home-grounds must choose one of these styles to exclusion of the other, and at present the natural style generally prevails; but the city or private park, and even the ample country home-grounds, can combine the two by assigning each its distinctive place, namely, the formal style near the residence—provided that be of dignified architectural style—or the city entrance to the park, and the naturalistic style beyond this and next to the fields or the woods. Thus, the Dresden Park, originally small and formal, has been enlarged by naturalistic grounds; while Central Park, New York, planned on the naturalistic scheme, yet includes the Mall ending in a terrace. Indeed, this composite style, as Edouard André names it, may furthermore include, according to favorable conditions, varieties such as a water garden, a bog or marsh garden, a rock garden, a wild garden, and a sub-tropical garden, each with its characteristic shrubs and herbs. The picturesque style, which F. A. Waugh proposes as a third leading style, approximates this wild variety; though, of course, like other varieties, it may easily expand into a whole park, as must happen in a mountainous district. The Japanese gardening also belongs to this variety, which has irregularity as its chief trait. The aviary and animal collection need never occupy more than one section of one of the parks in a metropolitan park system; but free singing birds and playful animals, such as the squirrel, should enliven every park, great or small, and will do so as soon as our predatory habits have yielded to the mild influences of art.

The principles of landscape gardening, like those of other decorative arts, include in the first place conformity to structure; then, unity of style; next, a variety in unity of the art elements known as mass, proportion, balance, surface, line, color, tonality, chiaroscuro, and texture; and, finally, finish and significance. The application of these principles obviously allows ample scope for originality of treatment. Structural conformity includes relation of house to grounds and of these to locality. A complete plan should be prepared for the park, and even for home-grounds, just as it usually is for a house; and no subsequent fancies should be allowed to disturb the integrity of this scheme for the whole. For home-grounds there are ordinarily needed three distinct sections. The first of these is the lawn between the front of the house and the street. If a front fence is

maintained, a border of shrubs should accompany it to give seclusion. Otherwise this border should run along the base of each house and from each house to the next, in order to seclude persons on the veranda or back lawn from the gaze of strangers. The second section is the area at the side and back of the house, which should be enclosed, by hedges or by belts or groups of shrubs, from the other sections and from adjoining properties. This second area should adjoin the living-rooms of the house, and may be simple turf with a flower border along the boundaries—in accord with the naturalistic style, or be divided into terrace, game courts, flower garden, and the like—in accord with the formal style. The third section embraces the kitchen-yard, laundry-yard, and stable, provided with an independent entrance, and screened by lattice with climbers or by shrubs from the street, as well as from other sections. The park structure must regard entrances, roads, paths, game courts, boat-houses, refectory, greenhouse, and the locations suitable for varieties in the composite style.

Unity of style is violated oftenest by introduction of statues or pattern bedding into grounds of the naturalistic style. In the composite style, the pattern bedding, flower garden, or rock garden should be detached from sharp contrast with other elements by hedge, shrubs, or sunken panel. Such unity does not exclude native or acclimated perennials and annuals from use in the home-grounds in front of the hedges or the boundary shrubs, which is, indeed, their ideal place, furnishing a shadowed foil, enlivened by the colors of the flowers.

The prime requisite of variety is that of mass in the grouping of trees or shrubs apart from the lawn or the flower beds. The mere "lover of flowers," untrained in landscape gardening, usually violates this principle by scattering shrubs or trees promiscuously over the grounds at his disposal. Even shrubs or herbs of one kind will be massed with advantage wherever space allows more than one specimen. Such grouping, especially at gateways and prominent curves of roads, will furnish varied views and unexpected beauties; while in other places it will entirely screen ugly objects, or reveal beautiful ones in varying degree. But single shrubs are admissible near the house, walk, or boundary, provided they are specimens of some choice plant.

The variety of proportion in its narrower sense of unequal, vertical divisions, as of a facade or a face, results from placing herbs, shrubs, and trees in this order receding from the house or the centre of the area. This order also gives a curving transition from horizontal ground to vertical tree; and, of course, it also affords each object the best display possible without seriously obstructing another. The whole plantation should be so planned as when mature to be in proportion to the extent of the grounds. In application to gardening, symmetry reduces to balance, that is, an equivalence instead of an equality of parts about a medial line. Variety in surface is secured by sloping, raising, or hollowing the lawn as a whole, and by raised beds or sunken panels for the formal garden. For small areas the concave lawn is best, because giving an effect of greater extent than is really the case. Variety in line must be sought equally in sky line, border line, bed

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line, and road line. The naturalistic style achieves this end by ovate curves, otherwise variously known as catenary, infinite, swelling, or sweeping curves. The curves of a road should be justified by a plantation, pool, or other impassable object, and the curves of a border by a larger shrub or a group of herbaceous plants. Bays in a tree border lead into vistas which suggest distance and extent of grounds. The formal style achieves variety in line by geometric curves and angles. Variety in color should be sought, not only in flowering herbs and shrubs, but in trees by introduction of those with yellow or red foliage. But the effects chiefly prized are quiet, restful ones, whereas violent contrasts, especially with geranium and coleus against a mowed lawn in pattern bedding, are generally decried. Brilliant masses in the formal style should be carefully harmonized, or be separated by low shrub hedges, bunches of ornamental grass, white flowers, or gravel walks. Tonality is likely to be violated by dark evergreens placed near light green deciduous trees. The degree to which the beauty of a landscape depends on chiaroscuro is fully revealed only by the photograph, which omits the colors that always accompany light and shade in nature. The same grouping that gives mass secures chiaroscuro also. Texture in a plant depends upon the number, shape, disposition, and tissue of its leaves, and varies widely from one plant to another. It therefore supplies an element of variety distinct from the size, shape, or color of the plant, be it herb, shrub, or tree. It is obvious that all the above mentioned qualities must be supplemented by a careful finish, which calls for constant care.

Finally, landscape gardening, like all other arts, has significance besides form. It reveals nature's patience, kindness, and serenity; and thus proves to be the great restorative to men jaded with life's cares. Again, the simple and healthful pleasures of outdoor life moderate the ever increasing demand for the expensive and wasting luxuries of our modern society. Moreover, the landscape designer can convey the simplicity, boldness, or dignity of his own creative mind to the impressionable observer by means of landscape gardening.

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EDMUND BUCKLEY,
Editor 'University Lessons in Art.'

Landseer, Sir Edwin Henry, English painter: b. London 7 March 1802; d. 1 Oct. 1873. Hampstead Heath was the scene of some of his early studies, and on one of his early productions now at Kensington his father has written "at the age of five." Following the advice of Haydon he studied the Elgin Marbles, the wild beasts, in the Tower and Exeter Exchange, and dissected every animal whose carcass was obtainable. His life is merely the record of his works. In the Academy's exhibition for 1815 he exhibited the 'Portrait of a Mule,' and the 'Heads of a Pointer-Bitch and Puppy.' In 1818 he contributed several studies of animals to the Academy and the British Institution. In that year a picture exhibited at the exhibition of the

Oil and Water Color Society in Spring Gardens, 'Fighting Dogs Getting Wind,' secured great applause. In 1820 he painted his 'Dogs of St. Gotthard.' In 1821 he exhibited 'Ratcatchers,' a 'Prowling Lion,' and other works of great spirit. In 1822 he received the premium of £150 from the British Institution for the 'Larder Invaded.' The 'Cat's Paw' appeared at the Academy in 1824, and was sold for £100. In 1826 he was elected A.R.A., and in 1830 became R.A. In 1827 he exhibited 'The Return from Deer-Stalking'; a 'Fire-side Party,' 1829; 'High Life,' and 'Low Life,' 1831; 'Spaniels of King Charles' Breed,' 'A Jack in Office,' 1833; 'Bolton Abbey in the Olden Time,' 1834; 'The Drover's Departure,' 1837; 'The Return from Hawking,' and the 'Shepherd's Chief Mourner,' 1837; a 'Distinguished Member of the Humane Society,' and 'There's Life in the Old Dog Yet,' 1838; in 1840, 'Laying Down the Law'; in 1844, 'Coming Events Cast Their Shadows Before,' and in 1846, 'The Stag at Bay'; in 1849, 'The Forester's Family'; in 1850, 'A Dialogue at Waterloo'; in 1851, 'A Scene from the Midsummer Night's Dream'; in 1853, 'Night and Morning,' and 'The Children of the Mist.' His later works include, 'Saved,' 'Deer-Stalking,' 'A Flood in the Highlands,' 'Wild Cattle at Chillingham,' his celebrated work of sculpture, the Lions in Trafalgar Square, and others. Landseer's pencil was productive, and besides many works not here named he produced portraits of horses, dogs, and other animals. In 1850 he was knighted; in 1855 he received the gold medal of the Paris exhibition. He declined the presidency of the Royal Academy offered him on the death of Sir Charles Eastlake (1865).

Land'slide, or Landslip, the slipping or sliding of land, through the failure of supporting strata, from its original position. They are due to a variety of causes. Water, particularly in its changing forms through frost and thaw, is the chief agent in their production. The wearing away of supports by water, the cracking of underlying materials by summer droughts, and the rending of existing crevices by the thawing of water frozen in them, are some of the commonest modes by which they are brought about. Sometimes a mass of land resting on an inclined bed slides for a considerable distance before it is arrested by a level surface; thus, in 1772, the Solway Moss, loosened by excessive rains, rolled over 400 acres of cultivated land, reaching in some parts to the roofs of the houses. The fall of the Rossberg in Switzerland, and the slip at Charmouth, near Lyme Regis, are other familiar instances. In 1902, in British Columbia a remarkable landslide occurred destroying an entire mountain village and causing the death of nearly 100 persons.

Landsturm, länt'stoorm, in Germany, a local militia, consisting of those of the reserve who are too old to serve in the LANDWEHR (q.v.). The landsturm is never called on to serve out of its own district except in case of invasion.

Landwehr, länt'vär ("national defense"), in Prussia, a term applied to that part of the military force of the state which is not kept constantly under arms, but during peace follows ordinary trades, and is only summoned into

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active service on the breaking out of war or some internal emergency. In 1805 Austria organized a landwehr; a Russian landwehr was employed in 1812; and in 1871, the system was extended to the whole German empire.

Lane, Anna Eichberg King, American author: b. Geneva, Switzerland, 1856. She is daughter of the late Julius Eichberg (q.v.), a distinguished Boston musician, and received her early education in that city. Her first husband was Tyler Batcheller King, of Boston; in 1868 she was married to John Lane, the publisher, of London and New York. She has written many short stories and poems, among the latter being her national hymn, 'To Thee, O Country!' Her prose writings include: 'Brown's Retreat,' 'Kitwyk,' and 'American Wives and English Housekeeping.'

Lane, Edward William, English Orientalist: b. Hereford 17 Sept. 1801; d. Worthing, Sussex, 10 Aug. 1876. He published 'Manners and Customs of the Modern Egyptians' (1836), and made one of the most famous translations of the 'Arabian Nights' (1838-40). This work was the first translation of consequence into English which was made directly from the Arabic, all previous translations having been made through the French. It contained valuable illustrations and numerous scholarly and indispensable notes. The translations of Burton and Payne were subsequent to it. The world is indebted to him for many valuable works on Egypt, and especially for his 'Arabic-English Lexicon' (1863-74), which cost him 20 years of unremitting labor. The succeeding parts came out from 1877 to 1882 under the editorship of S. Lane-Poole, the whole forming a dictionary indispensable to the student of Arabic. See ARABIAN NIGHTS.

Lane, George Martin, American educator: b. Charlestown, Mass., 24 Dec. 1823; d. Cambridge, Mass., 30 June 1897. He was graduated from Harvard in 1846 and after four years at the universities of Berlin and Göttingen returned to America and became professor of Latin at Harvard in 1851. He held this chair until 1894 when he became professor emeritus. He published 'Latin Pronunciation' in 1871, in which he contended for the continental pronunciation of the language as against the 'English method.' He left unfinished a Latin Grammar, completed by Morgan (1898). The famous ballad of 'The Lone Fishball' was written by Professor Lane.

Lane, Henry Smith, American politician: b. in Montgomery County, Ky., 24 Feb. 1811; d. 1881. He studied law, and was admitted to the bar; removed to Indiana in 1832, and while engaged in his profession became prominent in Whig politics. After serving as State senator (1837), he was twice elected to Congress (1838 and 1840), and in the Mexican War lieutenant-colonel of an Indiana regiment. The dissolution of the Whig party was followed by a preliminary organization which led to the formation of the Republican party, and in this movement Lane was conspicuous, acting with other leaders who planned the first Republican national convention, held in Philadelphia in 1856, and of which he was permanent chairman. A coalition of Republicans with members of the disappearing American party in 1859

elected him to the United States Senate, but after a contest he was unseated in favor of his Democratic competitor. He was elected governor of Indiana in 1860, and in the same year became United States senator, serving one term.

Lane, James Henry, American politician and soldier: b. Lawrenceburg, Ind., 22 June 1814; d. Leavenworth, Kan., 11 July 1866. He was admitted to the bar in 1844, enlisted as private in an Indiana regiment in 1846, served in the Mexican War, became colonel, and at Buena Vista commanded a brigade. Returning from the war, he was elected lieutenant-governor of Indiana; from 1853 to 1855 was a Democratic representative in Congress; in the latter year removed to Kansas, joined the Free-State party, acted as president of the Topeka and Leavenworth constitutional conventions, and became major-general of the Free-State forces. In 1856 the Free-State legislature elected him to the United States Senate, but he was not allowed to sit. He was a prominent actor in turbulent scenes, and was twice indicted, once for treason and again for murder: on the second charge he was tried and acquitted. In 1861 Kansas was admitted to the Union, and Lane was elected United States senator, but entered the Federal army and in the same year was appointed brigadier-general of volunteers, serving with ability until March 1862, when his commission was canceled. The 'Great Southern Expedition' from Kansas (1861-2) and other military schemes of the period were conceived by Lane, but came to nothing. As commander for recruiting in the Department of Kansas (1862) he came into collision with the State authorities and was charged with attempted usurpation. In 1865 he was again elected to the United States Senate, suffered from paralysis in the following year, and died by his own hand.

Lane, Joseph, American soldier and politician: b. Buncombe County, N. C., 14 Dec. 1801; d. Oregon 19 April 1881. In 1816 he went from Henderson County, Ky., to Warwick County, Ind., where he was for some time clerk in a mercantile establishment, and in 1822-46 served in both houses of the State legislature. He resigned from the senate in 1846 to enlist as a private in the 2d Indiana volunteers, was soon commissioned colonel of the regiment, and in the same year was promoted brigadier-general. He was wounded at Buena Vista, defeated Santa Anna at Huamantla, and was brevetted major-general, U. S. A., for this service. After the Mexican War he was appointed governor of Oregon territory, was Democratic delegate from Oregon to Congress in 1851-7, defeated the Rogue Indians at Table Rock in 1853, and in 1859-61 was a United States senator. He was nominated for the vice-presidency in 1860 on the unsuccessful Breckinridge ticket.

Lane, Sir Ralph, English administrator in America: b. Northamptonshire, England, about 1530; d. in Ireland 1604. In 1583-4 he held a command in Ireland, in 1585 took the direction of the colony that Raleigh was establishing in Virginia, sailed in that year in the fleet commanded by Sir Richard Grenville, and was left with 107 colonists at Roanoke Island, while the fleet returned to England (25 August). He was thus the first governor of Virginia. The

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location proved unsuitable, provisions ran low, and there was trouble with hostile Indians. On 19 June 1586 the colony sailed for England in the fleet of Sir Francis Drake. In 1589 Lane was a colonel in Drake's expedition against Portugal, and in 1591 helped to quell a rebellion in Ireland. Letters by him may be read in Hawks' 'History of North Carolina' (1857); and in Hale (editor), 'Archæologia Americana,' Vol. IV. (1860).

Lane, William Coolidge, American librarian: b. Newton, Mass., 29 July 1859. He was graduated at Harvard in 1881, and was assistant librarian there from 1887 to 1893, when he became librarian of the Boston Athenæum, continuing in that position until 1898, since when he has been the librarian of Harvard University. From 1886 to 1900 he served as secretary and treasurer of the publishing board of the American Library Association, and in 1898–9 was president of the association.

Lane-Poole, Stanley, English archæologist: b. London 18 Dec. 1854. He is a nephew of E. W. Lane, the Orientalist (q.v.). He was educated at Corpus Christi, Oxford; in 1874–92 was employed in the coin department of the British Museum; was sent by the British government on archæological missions to Egypt (1883) and Russia (1886); was employed by the Egyptian government in archæological research at Cairo (1895–7); and in 1898 became professor of Arabic in Trinity College, Dublin. Among his works are: 'Social Life in Egypt' (1883); 'The Moors in Spain' (1887); 'Saracenic Egypt' (1900); 'Medieval India' (1902); and 'The Story of Cairo' (1902). He also edited many volumes, and prepared the extensive catalogue of the Oriental and Indian coins in the British Museum (1875–92).

Lane Theological Seminary, a divinity school founded at Cincinnati, Ohio, 1829. It was opened for students three years after its foundation, and its endowment in 1902 amounted to \$480,929; its income \$18,078; it had five instructors and 20 students. Although it is under the control of the Presbyterian Church it receives students from other reformed bodies. No tuition fees are charged, board is low, and there are 39 scholarships, each of the value of \$2,000. The college stands on a lot of sixty acres; there are five professors' houses, and a library containing 19,000 volumes.

Lanessan, Jean Antoine de, zhōn āñ-twāñ dē lāñ-ē-sāñ, French naturalist and publicist: b. Saint-André-de-Cubzac, Gironde, 13 July 1843. He entered the health corps of the French marine service, after studying medicine at Bordeaux, and was engaged as surgeon on the coast of Africa and China until the Franco-Prussian war. He was elected to the National Assembly in 1881, and came into notice as a republican journalist. Being interested in colonial matters he was appointed governor-general of Indo-China in 1891; and his writings have done much to promote French colonization. His principal works are: 'De Proto-plasme végétal' (1876); 'La Matière, la Vie et les Etres Vivants' (1879); 'L'Expansion Coloniale de la France' (1888); 'Principes de Colonisation' (1897).

Lanfranc, lāñ'frāñ (Fr. lāñ-frāñ), Anglo-Norman ecclesiastic, the first archbishop of

Canterbury after the Norman Conquest: b. Pavia, Italy, about 1005; d. Canterbury, Kent, 24 May 1080. After studying law in his native city he left Italy about 1039, and founded a school of law at Avranches, which soon became one of the most popular in Europe, but entered the Benedictine monastery of Bec, and in 1046 was chosen its prior. About 1053 he came into close relations with William of Normandy, and though he at first condemned William's marriage with his cousin, he afterward (1059) went to Rome to procure the papal dispensation for it. William accordingly made him prior of his new foundation, the abbey of St. Stephen at Caen (1062), and in 1070 made him archbishop of Canterbury in place of Stigand. Lanfranc was William's most valued counsellor and continued in the reign of William Rufus to exercise great influence in the government of England. See Freeman, 'History of the Norman Conquest.'

Lanfrey, Pierre, pē-är läñ-frā, French historian and publicist: b. Chambéry 26 Oct. 1828; d. Pau, France, 15 Nov. 1877. He was educated in the Jesuit college of his native town and in Paris, and became well known by the publication of works in support of political and religious liberalism. These include: 'L'Eglise et les Philosophes au XVIII. Siècle' (1855); 'Essai sur la Révolution Française' (1858); 'Histoire Politique des Papes' (1860); 'Lettres d'Everard' (1860), a social novel in epistolary form; 'Le Rétablissement de la Pologne'; and 'Etudes et Portraits Politiques' (1863). His most important work is a 'History of Napoleon I.' (1867–75), which is strongly hostile to Napoleon. It was left incomplete at his death. In 1871 he was elected to the National Assembly by the department of Bouches-du-Rhone, and took his seat with the republican left. He was ambassador at Berne 1871–3, and in 1875 he was elected a life senator.

Lang, Andrew, Scottish author: b. Selkirk 31 March 1844. He was educated at St. Andrews and at Balliol College, Oxford; was elected fellow of Merton, Oxford, in 1868; in 1888 was appointed Gifford lecturer on natural religion at St. Andrews; became a constant contributor to periodical literature; and published an extensive list of volumes on a wide variety of subjects, being recognized as the most versatile of present-day writers. His wide learning appears in his prose renderings of the 'Odyssey' (1879; with Butcher), and the 'Iliad' (1882; with Myers and Leaf), and 'Homer and the Epic' (1893), a defense of the unity of the poems; in his works on comparative mythology and religion, 'Custom and Myth' (1884), 'Myth, Ritual, and Religion' (1887; new ed. 1899); 'The Making of Religion' (1898), and 'Magic and Religion' (1901); and in his studies of Scottish history, such as 'A History of Scotland from the Roman Occupation' (1900 et seq.). Some of the most interesting of his work is to be found in 'Letters to Dead Authors' (1886); 'Letters on Literature' (1889); 'Angling Sketches' (1891); 'Essays in Little' (1891), and other causeries. He published also collections of *vers de société*, 'Ballades in Blue China' (1880), and 'Rhymes à la Mode' (1884); and further in verse, 'Ban et Arrière Ban' (1894), and his most ambitious poem, 'Helen of Troy' (1882). Mention should also

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be made of 'Cock-Lane and Common Sense' (1894), a discussion of the spiritualistic question; and the biographies of Lockhart (1896) and Tennyson (1901).

Lang, Benjamin Johnson, American musician: b. Salem, Mass., 28 Dec. 1837. He studied music under his father, an organist and piano-forte teacher, and at 15 began work as teacher and organist. In 1855 he went to Germany for further study, which for three years he pursued under the instruction of Liszt, Albert Jaell, and others. Returning to Boston, he at once attained prominence as organist, pianist, teacher, and conductor; became organist of the Handel and Haydn Society in 1859, and conductor of the same in 1865; conductor of the Apollo Club in 1868; and of the Cecilia Society in 1874. In 1869 he made a second visit to Europe, and gave concerts in Berlin and other cities. As a member of the concert committee of the Harvard Musical Association he has done much in the interest of musical culture, and through this and other organizations has secured the production of many new works. The introduction of Wagner to the American public was in no small part due to his presentation of that master. While he has accomplished much work as a composer, few of his compositions have been published.

Lang, John Marshall, Scottish Presbyterian clergyman and author: b. Glasford, Lanarkshire, 4 May 1834. After completing his education at Glasgow University he took charge of several churches in succession, but returned to Glasgow in 1873, and was appointed to the Barony Church, where he had previously been installed in 1865, but left it for Edinburgh in 1868. In 1900 he was elected vice-chancellor and principal of Aberdeen University. He is the author of 'Gnostic Sects and Heresies' (1873); 'Heaven and Home' (1875); 'The Last Supper of Our Lord' (1881); 'Life: Is it Worth Living?' (1883); 'Ancient Religions of Central America' (1882); 'The Church and the People' (1893).

Lang, Margaret Ruthven, American composer: b. Boston 27 Nov. 1867. She studied the pianoforte under her father, B. J. Lang (q.v.); the violin under Louis Schmidt in Boston, and (1886-7) with Drechsler and Abel in Munich; composition with Victor Gluth in Munich; and orchestration (1887) under G. W. Chadwick, Boston. Her piano solos, songs, etc., have been received with high appreciation in musical circles; her 'Dramatic Overture' has been performed by the Boston Symphony Orchestra, and the Chicago Orchestra has several times given 'Witichis,' Theodore Thomas conducting.

Lang, Wilhelm, vil'hēlm läng, German journalist and essayist: b. Tuttlingen 16 July 1832. Among his works are: 'Michelangelo Buonarrotti as a Poet' (1861); 'David Friedrich Strauss' (1874); 'Wanderings in Peloponnesus' (1878); 'From Suabia: History, Biography, Literature' (in 7 parts, 1885-90), a collection of delightful essays; 'The German Party in Würtemberg 1866-91' (1892).

Lang'bridge, Frederick, English clergyman and author: b. Birmingham 17 March 1849. He was graduated at Oxford University and adopted the profession of private tutor and schoolmaster. He is now rector of St. John's, Limerick. He has published 'Gaslight and

Stars' (1892); 'A Cracked Fiddle' (1892); 'Ballads for the Brave' (1890); 'Love Has no Pity' (1901); etc.; and many books for young people.

Lang'dell, Christopher Columbus, American lawyer: b. New Boston, Hillsborough County, N. H., 22 May 1826. He studied at Harvard, was graduated from its law school in 1853, in 1853-70 practised in New York, in 1870 became professor of jurisprudence in the Harvard law school, and in 1871 dean of the law school faculty. In 1895 he retired. He was an originator of the so-called "case" system of legal study, and was otherwise prominently identified with the progress of professional education in this country. His publications include: 'Selection of Cases on the Law of Contracts' (1870; enlarged ed. 1877); 'Cases on Sales' (1872); 'Summary of Equity Pleading' (1877; 2d ed. 1883); and 'Cases in Equity Pleading' (1878).

Lang'don, John, American statesman: b. Portsmouth, N. H., 25 June 1741; d. there 18 Sept. 1819. At the outbreak of the Revolutionary War he embarked in the patriotic cause, and in 1775 he was a delegate to the Continental Congress, but resigned office in June 1776, on becoming navy agent. In 1777, while speaker of the New Hampshire assembly, he pledged a large portion of his property for the purpose of equipping the brigade with which Stark defeated the Hessians at Bennington. Subsequently he was a member and Speaker of the State legislature, a member of the Continental Congress, a delegate to the convention which framed the Constitution of the United States, and president of New Hampshire. He was one of the first United States senators from New Hampshire, which office he held until 1801. In politics he acted with Jefferson, who upon assuming office in 1801 offered him the post of secretary of the navy, which he declined. From 1805 to 1812, with the exception of two years, he was governor of New Hampshire; and in 1812 he was offered by the Republican congressional caucus the nomination for the office of vice-president of the United States, which, on the score of age and infirmities, he declined. The remainder of his life was passed in retirement.

Langdon, Samuel, Congregational clergyman and educator: b. Boston, Mass., 1723; d. Hampton Falls, N. H., 1797. He was graduated from Harvard in 1740 and was pastor at Portsmouth, N. H., 1747-74. In 1774 he became president of Harvard, resigning in 1780. In the New Hampshire Convention he ardently advocated the ratification of the Federal Constitution.

Lange, läng'é, Julius Henrik, Danish art critic: b. Vordingborg 10 June 1838. After leaving the University of Copenhagen he traveled in Italy, and thereafter devoted himself to study of the history of art. Among his works are: 'On Art Values' (1876); 'Danish and Foreign Art' (1879); 'Gods and Men in Homer' (1881); 'Art and Politics' (1885); 'Bastien Lepage and Other Painters' (1889); 'Thorwaldsen's Representation of the Human Figure' (1893).

Langevin, läñzh-väñ, Sir Hector Louis, Canadian statesman: b. Quebec 26 Aug. 1826. He was called to the bar in 1850, was editor of the 'Mélanges Religieux' in 1847, and of the 'Courrier du Canada' ten years later, and was

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appointed Queen's Counsel in 1864. Entering the Canada Assembly he became a member of the executive council, and at the union of the provinces in 1867 was made secretary of state for Canada, was subsequently minister of public works (1869-73); postmaster-general (1878); and minister of public works (1879). He retired from public life in 1891.

Langevin, Jean François Pierre La Force, zhōn frāñ-swā pē-är lä förs, French-Canadian Roman Catholic bishop: b. Quebec 22 Sept. 1821; d. 26 Jan. 1892. He was educated at the Quebec Seminary, was ordained priest in 1844, and consecrated bishop of Ramonski in 1867. In 1870 he founded the College of Ramonski, and in 1886 was appointed assistant to the apostolic throne. Among his publications were: 'Histoire du Canada en Tableaux' (1860); 'Cours de Pédagogie' (1865).

Langevin, Louis Philip Adelard, Canadian Roman Catholic prelate: b. St. Isidore, La Prairie County, Quebec Province, 23 Aug. 1855. He was educated at Montreal College; studied theology at the Sulpician Grand Seminary and St. Mary's College, Montreal; was ordained priest in 1882; was appointed professor of moral theology in the Catholic University of Ottawa; and in 1893 became rector of St. Mary's Church of Winnipeg. In 1895 he took office as archbishop of St. Boniface, Manitoba. He founded many parishes, and educational and missionary institutions.

Lang'ford, John Alfred, English journalist and lecturer: b. Birmingham 12 Sept. 1823. He has worked on the editorial staff of the Birmingham *Daily Press*, *Daily Gazette* and *Morning News*. He was teacher of English literature in the Birmingham and Midland Institute (1868-74). His publications include poems, essays, local histories, the chief of which are 'Prison Books, and Their Authors' (1861); 'The Praise of Books' (1880); 'A Century of Birmingham Life' (1868); 'Staffordshire and Warwickshire, Past and Present' (1874); 'A Life for Love, and Other Poems' (1900); etc.

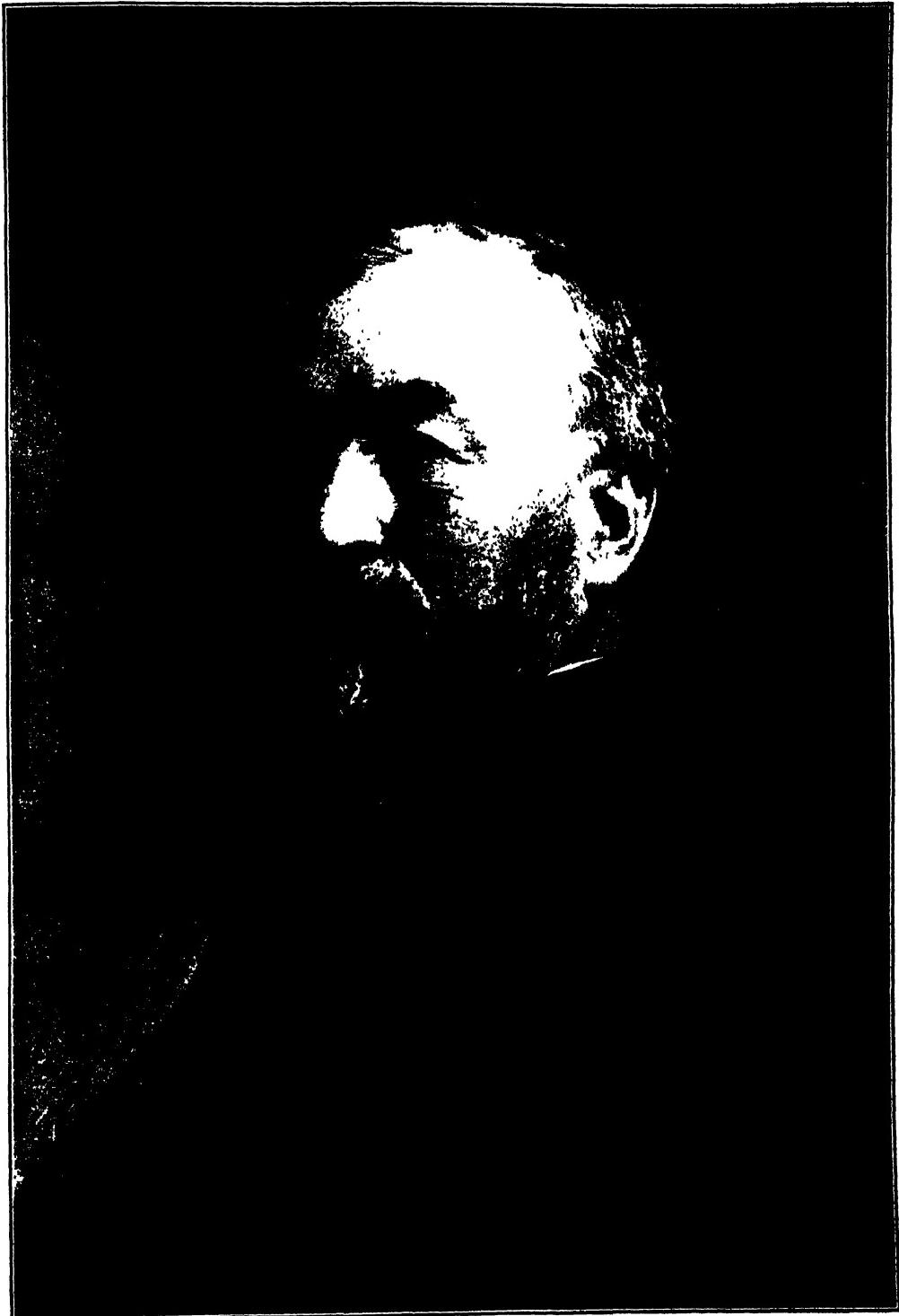
Lang'horne, John, English poet and translator of Plutarch: b. Kirkby Stephen, Westmoreland, March 1735; d. Blagdon 1 April 1779. Having taken orders, he became a curate in Essex in 1761, and rector of Blagdon, Somerset, in 1766. In 1777 he was installed a prebendary of Wells Cathedral. He wrote verses and stories once popular, but he is remembered now only by the translation of Plutarch's Lives which he made with his brother William (1721-72). This work, originally published in 1770, has passed through many editions.

Langland, läng'länd, Langeland, or Longland, William, English poet: b. Cleobury Mortimer, about 1332; d. about 1400. Little is known of him except from tradition, according to which he was educated at Oxford, and became a monk of Malvern. The familiarity of the author with the Scriptures and the church fathers indicates that he was an ecclesiastic; several local allusions in the poem, and the fact that its scene is the "Malverne Hilles," prove that it was composed on the borders of Wales; and internal evidence fixes its date at about 1362. It narrates the dreams of Piers Ploughman, who, weary of the world, falls asleep beside a stream in a vale among the Malvern hills; and while satirizing in vigorous allegorical descrip-

tions the corruptions in church and state, and the vices incident to the various professions of life, and painting the obstacles which resist the amelioration of mankind, presents the simple plowman as the embodiment of virtue and truth, and the representative of the Saviour. Its ancient popularity appears from the large number of MS. copies still extant, most of them belonging to the latter part of the 14th century. It was a favorite of religious and political reformers, and several imitations of it appeared, the most important of which was 'Piers Ploughman's Crede,' written about 1393 by some Wycliffite, assailing the clergy, and especially the monks. In 1550 the 'Vision of Piers Ploughman' was printed by the reformers, and so favorably received that three editions were sold within a year. This poem is a remarkable example of a system of verse, derived from the Anglo-Saxons, and marked by a regular alliteration instead of rhyme. There are two classes of manuscripts, which give the text with considerable variations. The best edition both of the 'Vision' and the 'Crede' is that of Wright (1856, new ed. 1897); and of the 'Vision,' that of Skeat (1886). Consult Jusserand, 'Piers Plowman: a Contribution to the History of English Mysticism' (1893), and 'Literary History of the English People' (1894).

Langley, läng'lī, Samuel Pierpont, American astronomer and physicist: b. Roxbury, Boston, 22 Aug. 1834. He entered the practice of architecture and civil engineering, became an assistant in the Harvard Observatory in 1865, and later assistant professor of mathematics in the United States Naval Academy, and in 1867 was appointed director of Allegheny Observatory. In 1887 he became secretary of the Smithsonian Institution. He organized in 1881 an expedition to Mount Whitney, Cal., where he was successful in re-establishing the color constant and in extending the invisible solar spectrum. He also devised the bolometer, or thermic balance, a contrivance for detecting minute differences of radiant heat and measuring accurately to less than one ten thousandth of a degree Fahrenheit. His name became generally known through his ineffective experiments in connection with the problem of mechanical flight. A sum of \$5,000 was voted him by Congress for the carrying out of his ideas. The general plan of his airship as tested consisted in the use of the aéroplane as a means of support; but neither this support nor the propulsive power was found adequate. Among his writings are: 'The New Astronomy'; 'Experiments in Aéro-Dynamics'; and 'Internal Work of the Wind.'

Langley, Walter, English painter: Birmingham, England, 1852. After attending the National School, Birmingham, he qualified himself as a lithographer, meanwhile studying in the local school of art. He there gained the National scholarship and studied at South Kensington two years; settled in Newlyn, Cornwall, 1882. He had been awarded a gold medal for painting both at Paris and Chicago. Among his watercolor paintings are: 'Among the Missing'; 'Departure of the Fleet'; 'Disaster'; 'After the Storm.' His oil paintings include: 'Never Morning Wore to Evening but Some Heart Did Break'; 'Motherless'; 'Bread-winners'; etc.



SAMUEL PIERPONT LANGLEY,
SECRETARY OF THE SMITHSONIAN INSTITUTION.

LANGOBARDI — LANIER

Langobardi, län-gō-bär'di. See LOMBARDS.

Lang'shan, a breed of small, active "Asiatic" fowls, long held in esteem by poultry-raisers; cocks weigh 10 pounds. Two varieties are approved—the pure white and the glossy black. See Poultry.

Lang'ston, John Mercer, American educator: b. in Louisa County, Va., 14 Dec. 1829; d. Washington, D. C., 15 Nov. 1897. He was born a slave, but when six years old was emancipated, and in 1849 was graduated at Oberlin College, where he was also (1853) a graduate in theology. Admitted to the bar in Ohio (1854), he practised law in that State for 13 years, and in 1869 was appointed professor of law at Howard University, Washington, D. C.; became dean of the law department, and in 1873 vice-president of the university. In 1871 he was appointed a member of the board of health of the District of Columbia, and was afterward elected secretary of the District. From 1877 to 1885 he was United States minister and consul-general in Haiti, and when he returned to this country he was made president of the Virginia Normal and Collegiate Institute at Petersburg. He was elected to Congress in 1888. He published "Freedom and Citizenship," a collection of addresses (1883).

Lang'ton, Stephen, English cardinal: b. about 1150; d. Slindon, Sussex, 9 July 1228. He was educated at Paris and while on a visit to Rome in 1206 Innocent III. created him a cardinal and nominated him to the see of Canterbury, consecrating him archbishop next year. King John refused to allow Langton to take possession of his see, and it was not till England had been placed under an interdict, John excommunicated and threatened with deposition, that the king yielded. Langton was acknowledged in 1213, and in August joined the insurgent barons, and acted with them in compelling John to sign Magna Charta. He crowned Henry III., and in 1223 demanded of him the full execution of the charter. He was the author of some theological treatises, and the division of the Bible into chapters has usually been attributed to him. Consult: Hook, "Archbishops of Canterbury."

Lang'try, Lily, English actress: b. Island of Jersey 1852. She was the daughter of the Rev. W. C. Le Breton, Dean of Jersey, and as the "Jersey Lily" (a name given by Millais to the portrait of her which he had painted) was famous for her singular beauty and social graces. In 1881 she made her first appearance on the stage at the Haymarket Theatre in "She Stoops to Conquer." She paid several professional visits to the United States, and in 1903 she starred in a play written by herself in collaboration with J. Hartley Manners.

Language. See ETYMOLOGY; PHILOLOGY; SCIENCE OF LANGUAGE; SPEECH; WRITING.

Languedoc, läng'gwē-dök (Fr. län-gé-dök), France, a former province, now forming the departments of Aude, Tarn, Hérault, Lozère, Ardèche, and Gard, as well as the arrondissements of Toulouse and Villefranche, in the department of Haute-Garonne; and the arrondissements of Puy and Yssingeaux, in the department of Haute-Loire.

Langur, län-goor', a monkey of the genus *Semnopithecus*, represented by numerous large

leaf-eating species from Ceylon and India eastward to China and Borneo. They form a transition group between the gibbons and the catarrhine monkeys, and include a large number of well-known species, with long hind legs and tails and no cheek-pouches, such as the entellus, or sacred monkey of India, the wanderoos of Ceylon, the lutongs of the Malayan islands, and several less known forms.

Lanier, la-nér', Clifford Anderson, American author: b. Griffin, Ga., 24 April 1844. He studied at Oglethorpe College, leaving at the end of his sophomore year, desiring to enter the Confederate army, for which, however, he was then too young. In 1862 he volunteered as a Georgia soldier; served in Virginia; was signal officer of a blockade-runner in 1864, and suffered shipwreck. In 1865 he became superintendent of schools at Montgomery, Ala. He has written "Thorn Fruit," a novel; "The Mate's Race with the Banshees"; "Love and Loyalty at War," and other stories; "Dialect Poems," with his brother, Sidney Lanier (in Poems of the latter); "Apollo and Keats on Browning, and Other Verses" (1902); etc.

Lanier, Sidney, American poet: b. Macon, Ga., 3 Feb. 1842; d. Lynn, N. C., 7 Sept. 1881. His father, Robert Lanier, a lawyer of Macon, came from a family noted for a love of music and art. An ancestor, Jerome Lanier, a Huguenot refugee, was well known at the court of Queen Elizabeth as a musical composer; another forebear, Nicholas Lanier, was director of music at the court of James I. and Charles I., and first marshal of the Society of Musicians incorporated at the Restoration. Sidney Lanier's mother, Mary Anderson, belonged to a prominent Virginia family also noted for decided talent for music and poetry. The poet's artistic temperament was therefore a direct inheritance. As a child Lanier was passionately fond of music and without any instruction learned to play on the guitar, piano, flute, and violin. A critic said of him in later years: "In his hands the flute was transformed into a voice that set heavenly harmonies into vibration." This passion for music also showed itself in his keen sensitiveness to rhythmic effect. At 14 he entered the sophomore class of Oglethorpe College, Georgia, and after three years graduated with distinction. He was tutor in the college until the outbreak of the Civil War, when he joined the Confederate army as a private soldier. He fought in several important battles, was transferred to the signal service, and finally became signal officer of a blockade runner. In the autumn of 1864 he was captured and confined in Point Lookout Prison. He had taken advantage of every leisure moment to pursue his studies in literature, modern languages, and music, and during his long idle hours in prison he gained a complete mastery of the technique of the flute. He was released in February 1865, and made his way on foot to Macon, but the fatigue of the journey added to the previous hardships of camp and prison caused a severe illness which did irreparable damage to his lungs. The years that followed were years of hand-to-hand fight for a subsistence. For two years he was clerk in a hotel in Montgomery, and there wrote his novel "Tiger Lilies," a book of power and promise, but hastily written and poorly sustained; he taught at Prattville, Ala.,

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and studied and practised law with his father for five years in Macon. In December 1867 he married Miss Mary Day of Macon, and her belief in his genius, her willingness to endure with him privation and hardship made possible the valiant struggle and the achievement of the next 14 years. In the autumn of 1873, after an unsuccessful attempt to re-establish his health by a winter in Texas, he determined to move to Baltimore, where he could find greater opportunities for culture. He played the flute in the Peabody orchestra; in the intervals of hemorrhage he wrote articles for magazines; he gave lectures on literature in private schools; and thus, with the generous aid of his father, he supplied the necessities of his family. His study of languages, of Anglo-Saxon and early English texts, of English and of foreign literature, was incessant and systematic. In February 1879 he was appointed lecturer on English literature at the Johns Hopkins University, and this position he held until his death. His two principal courses of lectures at the university are embodied in his 'Science of English Verse' (1879), a thorough and suggestive treatise on English metre, declaring that English verse depends on stress, not accent, and that it is based on certain easily recognized musical rhythms, and 'The English Novel' a masterly treatment of the development of the idea of personality and its place in the modern novel. Again and again Lanier was driven by illness to Texas, to Florida, to North Carolina, but he was never idle; he studied much, he thought largely on all vital subjects, on love, life, art, economics, religion, and now and then he gave to the world poems of exquisite truth and beauty. In the spring of 1881 it became evident that the unequal fight was nearing its end, and as a last resort he tried tent life in the mountains of North Carolina. The last illness came at Lynn, in Polk County, and on a morning of early September he passed away.

Lanier's most important prose works besides those already mentioned are: 'The Boy's Froissart' (1878); 'The Boy's King Arthur' (1880); 'The Boy's Mabinogion' (1881); 'The Boy's Percy' (1882); 'Shakespeare and his Forerunners' (1902). His best known poems are: 'Hymns of the Marshes'; 'Clover'; 'The Song of the Chattahoochee'; 'The Crystal'; 'Corn'; 'The Symphony', and 'The Centennial Meditation.' The distinctive characteristics of his poetry are a wholesome outlook upon life, a constant recognition of the highest in character and in thought, and a varied fresh and melodious rhythm. His passion for good and love, his robustness, his high conception of the meaning and power of the love of man and woman, proclaim his close kinship to Browning. In questions of social economics Lanier was abreast of his time; he believed in the rights of the individual, he hated the iron hand of unjust trade, but he realized that these problems must be solved in the "patient modern way." He knew that the great poet must be an artist in sound and color, as well as a thinker, and that no labor was too arduous for perfecting verse forms; to attain perfection in his art the poet must make the mechanical verse fulfil its vast possibilities, he must gain the mastery over imagination, so that imagination may become his servant. But for Lanier there was no art for art's sake; art was consecrated to man and to God. Like all

true poets he lived near to nature, and he has described our Southern scenery with loving faithfulness warmed by vivid imagination. He has given new meaning to "our forests of live-oak beautifully braided and woven with intricate shades of the vine; to our broad fronded fern and keen-leaved canes." The luxuriance of the southern forests, the wealth of undergrowth, the warmth, the color, the singing birds live in his poetry, but there is no undue heat, no tropical languor. Whittier has not been more faithful to the rocky coasts, to the snowstorms of New England, than has Lanier to the South. Consult his completed poems with memoir by W. H. Ward (1881-4). **EMILIE McVEA,**
See'y Southern Association of Southern Women.

Lanigan, George Thomas, American journalist and poet: b. Canada 10 Dec. 1845; d. Philadelphia 5 Feb. 1886. With Robert Graham, he founded in Montreal the 'Free Lance,' a satirical and humorous journal, later published as the 'Evening Star,' and afterward in the United States was connected with the New York *World* and other journals. His writings include: 'Canadian Ballads' (1864); 'Fables Out of the World' (1878), by 'George Washington Aesop.' He will be longest remembered by his 'Threnody' (for the Ahkoond of Swat), one of the most successful of humorous poems.

Lankester, Edwin Ray, English zoologist: b. London 15 May 1847. Educated at Downing College, Cambridge, and Christ Church, Oxford, he was elected a fellow and lecturer of Exeter College, Oxford, in 1872. In 1874-90 he was professor of zoology and comparative anatomy in University College, London, and from 1891 till 1898 Linacre professor of human and comparative anatomy at Oxford. Since 1898 he has been director of the natural history department of the British Museum. Elected a fellow of the Royal Society in 1875, he became its vice-president in 1896, and in 1885 he was awarded one of its royal medals. In 1884 was prominent in founding the Marine Biological Association, now located at Plymouth, and in 1869 became chief editor of the 'Quarterly Journal of Microscopic Science.' Lankester's works include the following: 'A Monograph of the Fossil Fishes of the Old Red Sandstone' (part I., 1870); 'Comparative Longevity in Man and the Lower Animals' (1870), an Oxford prize essay: 'Contributions to the Developmental History of the Mollusca' (1875); 'Studies in Apus, Limulus, and Scorpio' (1881); 'On Food' (1882); and 'The Advancement of Science' (1890), nine essays and addresses.

Lan'man, Charles, American author: b. Monroe, Mich., 14 June 1819; d. Washington, D. C., 4 March 1895. He was educated at the Academy of Norwich, Conn., and went to New York, where he was in business from 1835 to 1845. He then returned to Monroe as editor of the 'Gazette.' He afterward joined the staff of the 'National Intelligencer' at Washington, D. C. He was private secretary of Daniel Webster in 1850, and secretary to the Japanese legation in Washington in 1871-82. He was among the first to explore the mountains in North Carolina. Among his writings are: 'A Tour to the River Saguenay' (1848); 'Private Life of Daniel Webster' (1852); 'Dictionary of Congress' (1858); 'The Japanese in America' (1872); 'Biographical Annals of the Civil Gov-

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ernment of the United States' (1876); 'Hazard Personalities' (1886); etc.

Lanman, Charles Rockwell, American Orientalist: b. Norwich, Conn., 8 July 1850. He was graduated at Yale in 1871; studied Greek and Sanskrit there, and from 1873 to 1876 pursued studies in Orientalism at Berlin, Tübingen, and Leipsic, returning in the latter year to accept a fellowship at Johns Hopkins University. Since 1880 he has been professor of Sanskrit at Harvard. He has lectured at many institutions on Oriental subjects; has traveled in India, and from 1879 to 1884 was secretary of the American Philological Association, edited its 'Transactions' (Vols. X.-XIV.), and in 1890 became its president. He was corresponding secretary of the American Oriental Society from 1884 to 1894 and in 1896, and has served it as vice-president since 1897. His published works include: 'Noun-Inflection in the Veda' (1880); a 'Sanskrit Reader, with Vocabulary and Notes' (1884-8); 'The Beginnings of Hindu Pantheism' (1890); 'Rāja-Cekhara's Karpūra-mañjari,' a translation of a Hindu drama of 900 A.D. (1900); and numerous contributions to Oriental and other journals.

Lanman, Joseph, American naval officer: b. Norwich, Conn., 11 July 1811; d. 13 March 1874. Entering the navy as a midshipman in 1825, he was commissioned lieutenant in 1835, commander in 1855, captain in 1861, and commodore in 1862. In the two attacks on Fort Fisher (1865) he led the line with the Minnesota, winning signal praise from Rear-Admiral D. D. Porter in his official report. He was raised to the rank of rear-admiral in 1867, and after further efficient services, in 1872 he was retired.

Lan'ner, the name of a small "noble" falcon formerly in high repute among European falconers of mediæval times, the identity of which, however, is not quite clear. It was probably the handsome reddish-gray *Falco feldegg* of the Mediterranean region, still highly valued among Bedouin falconers for its docility and graces. The name is extended to other African and Asiatic hawks of similar appearance and qualities.

Lanoe, Falconer. See HAWKER, MARY ELIZABETH.

Lan'olin, a fatty substance obtained from the grease of sheep's wool, and consisting chiefly of cholesterin. The wool-grease is saponified by means of caustic soda, and the resulting emulsion is diluted with water. The lanolin then separates in fine particles, which, by the aid of a centrifugal separator, may be obtained in a creamy mass. The lanolin of commerce contains about 30 per cent of water. Lanolin is very generally used as a basis in the preparation of salves and ointments, since it does not grow rancid, and is itself antiseptic to a certain extent. It absorbs water, and penetrates the tissues of the body much more freely than lard or vaseline.

Lans'dell, Henry, English clergyman, traveler, and author: b. Tenterden, Kent, 10 Jan. 1841. As secretary to the Irish Church Mission, he has been prominent in philanthropic movements, traveling extensively about the world. In Siberia he investigated the prisons, publishing the results of his observations in

'Through Siberia' (1882); 'Russian Central Asia' (1885); 'Chinese Central Asia' (1893). Since 1892 he has been chaplain of Morden College, Blackheath, Kent.

Lans'downe, Henry Charles Keith Fitz Maurice, 5th MARQUIS OF, British statesman: b. 14 Jan. 1845. He was educated at Eton and Oxford, and entered in politics as a member of the Liberal party. He was one of the Lords of the Treasury (1869-72); Under-Secretary for War (1872-4); and in 1883 successor of the Marquis of Lorne as Governor-General of Canada. His period of office was marked by the completion of the Canadian Pacific railway, a peaceful arbitration of the fishery dispute with the United States, and the crushing of Riel's rebellion. In 1888 he was made Viceroy and Governor-General of India, in 1895 joined Lord Salisbury's cabinet as secretary for war, and in 1900 was appointed secretary of state for foreign affairs.

Lans'ford, Pa., borough in Carbon County, on the Central railroad of New Jersey, 44 miles north of Reading. It is the centre of the anthracite coal fields. It was settled in 1845, and was incorporated in 1876. The government is administered by a burgess elected every three years and a borough council which controls the local administrative offices. Pop. (1890) 4,000; (1900) 4,800.

Lan'sing, John, American jurist: b. Albany, N. Y., 30 Jan. 1754; d. 12 Dec. 1829. He studied law in Albany and New York; was engaged in practice at the beginning of the Revolution, during a period of which he served as military secretary to Gen. Schuyler. In 1784 he was elected to Congress, and while a member of that body was elected to the lower house of the New York legislature, where he was chosen speaker in 1786, in which year he also became mayor of Albany. For a short time he represented New York in the Constitutional Convention (1787), which he left because he held that he had been sent to participate in an amendment of the Articles of Confederation, and not in the forming of a new constitution. In 1788, at the New York convention, his opposition to the ratification of the Constitution was stoutly maintained. He served on the New York-Vermont boundary commission; in 1790 was appointed a judge of the New York Supreme Court, and became chief justice in 1798. From 1801 to 1814 he was chancellor of the State.

Lansing, Mich., city, capital of the State and county-seat of Ingham County, at the junction of the Grand and Cedar Rivers, and on the Chicago & G. T., the Lake Shore & M. S., and several other railroads, 85 miles northwest of Detroit. It is the farming trade centre for the surrounding region, and is engaged in the manufacture of agricultural implements, flour, stoves, machinery, beet sugar, canned goods, carriages, wagons, trunks, wheelbarrows, artificial stone and knit goods. It contains the State Capitol, built at a cost of \$1,500,000; State Hospital; State Library, containing 105,000 volumes; United States government buildings; State School for the Blind; and the State Industrial School; State Agricultural College with a farm of 675 acres; and has electric light and street railroad plants; water power from the river; which is spanned by several bridges; National

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and State banks; about 20 churches; daily, weekly, and monthly periodicals; and an assessed property valuation of over \$6,000,000. Under a charter of 1897, the city is governed by a mayor and council elected every two years. The waterworks and electric light plants are owned and operated by the municipality. The city was settled in 1837, laid out for the State capital in 1847 and incorporated in 1869. Pop. (1890) 13,102; (1900) 16,485.

Lansing Man, a term applied to a collection of human bones, found near Lansing, Kan., 20 feet below the surface of the earth, under a stratum of carboniferous limestone. The skull which was well preserved measured: Maximum length 188 mm.; breadth 138 mm.; cranial index 73.4. From the date of this discovery a few years ago, men of science have been divided in their opinion as to the antiquity of the remains. According to some scientists this skull is one of the oldest ever found in America, having belonged to a human being who lived on this continent prior to the glacial period; and as such, is of the same age, if not older, than that of the Pithecanthropus, found in Java, by Dr. Dubois. The opposition holds to the contrary, pointing to the fact that while of a rather low type of man, the skull differs very little from that of a modern Sioux Indian, and is not at all like that of the Java skull, which belonged to a being midway between the highest type of kula-kamba chimpanzee and the lowest type of negro. In the opinion of Prof. Upham, the Lansing skeleton offers probably the oldest proof of man's presence on this continent; yet it is only a third, probably only an eighth, as old as the flint hatchets of St. Acheul. It has been estimated that man in the Somme Valley and other parts of France, and in southern England, made good palæolithic implements fully a hundred thousand years ago. When the earliest man came to America cannot probably be closely determined. It may have been during the glacial period; it may have been earlier. In Prof. Upham's opinion, the Lansing discovery gives us much definite knowledge of glacial man, dolichocephalic, low-browed, and prognathous, having nearly the same stature as our people to-day. Prof. Williston believes that the Lansing man was doubtless contemporary with the equus fauna, well represented in the late Pleistocene deposits of Kansas, which include extinct species of the horse, bison, mammoth and mastodon, moose, camels, llamas and peccaries. He was also the contemporary of the late palæolithic men of Europe, whose advanced implements showed that they had developed beyond the stages of primitive savagery.

Lansquenet, läns'kē-nēt, in Germany, a foot soldier, originally one belonging to the army of the Emperor Maximilian in the 15th century; afterward, a soldier of fortune; a soldier who gave his services to any one who paid highest. The name became corrupted into lance-knight. Also the name of a game at cards now obsolete, and originally played in the 15th century. It is similar to faro.

Lan'tern, or **Lanthorn**, (1) a small metallic frame used for carrying a lamp or candle in, consisting of a case or vessel made of tin. Lanterns were used by the ancients in augury. They were also carried before troops on the march by night, being then borne on the top of pikes, and

so constructed as to throw lights only behind them. Dark lanterns are provided with only a single opening, which can be closed up when the light is required to be hidden, or opened when there is occasion for its assistance to discover some object. See **LAMP**.

(2) In architecture, a small structure on the top of a dome, or in other similar situations, for the purpose of admitting light, promoting ventilation, or for ornament, of which that on the top of the capitol at Washington may be referred to as an example. In Gothic architecture the term is sometimes applied to *louvers* on the roofs of halls, etc., but it usually signifies a tower which has the whole height, or a considerable portion of the interior, open to view from the ground, and is lighted by an upper tier of windows.

Lantern-fish, a general term for the luminous fishes of the depths of the sea, most of which belong to a single group (*Iniomii*). See **DEEP SEA EXPLORATION**; **DEEP SEA LIFE**; **FISH**; **ICHTHYOLOGY**.

Lantern-flies, homopterous bugs with membranous forewings concealing the folded hinder wings when the insects are at rest, and the head greatly prolonged and said to be light-giving in some tropical species. They feed upon plants and deposit their eggs in slits cut in the bark. The best known species is the candle-fly (*Fulgora laternaria*) of tropical America, but the luminosity alleged of it is an old story not recently verified. Many other popular beliefs are attached to the insect. It is said in Brazil, for instance, to be so poisonous that anything against which it strikes its long beak will fall dead. Several small and non-luminous species of this family occur in the United States. Consult Brunner, 'Am. Naturalist,' Vol. XXIII., 1885, p. 835.

Lantern of Demosthenes. See **LYSICRATES**, MONUMENT OF.

Lanterns, Feast of, a religious ceremony held in China on the 15th day of the first month of the year. It derives its name from the vast number of lanterns which are hung out of the houses and in the streets. The lanterns used are often of great value, being richly ornamented with gilding, painting, japanning, and sculpture, and some of them are of great size, reaching nearly 30 feet in diameter, and are so constructed as to resemble halls or chambers.

Lanthanum, a rare metallic element resembling cerium in its general properties, discovered by Mosander, in 1839, in the Swedish mineral cerite. It has the chemical symbol La, and an atomic weight (for O=16) of 138. Its melting point is between that of antimony (840° F.) and silver (1740° F.). It has a specific gravity of 6.16, and a specific heat of 0.0448. It is a white metal, moderately ductile and malleable. It oxidizes rapidly upon exposure to the air, and decomposes water slowly when cold, and rapidly when hot. It dissolves readily in acids, with the formation of corresponding salts, which are mostly colorless, with an astringent taste. The metal is prepared by the reduction of its chloride by metallic potassium, and the subsequent removal of the potassium chloride that is formed, by washing with alcohol. Neither lanthanum nor its salts are of any industrial importance. The name is from a Greek word meaning "concealed," in allusion to

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the fact that lanthana, the oxid, was for a time confused with the oxids of other rare metals belonging to the cerium group. Lanthanum occurs, as a silicate, in the minerals cerite, gadolinite, orthite, and allanite; as a carbonate in lanthanite occurring in Lehigh County, Pa., and Essex County, N. Y.

Lanza, lán'zā, **Gaetano**, American mathematician and engineer: b. Boston 26 Sept. 1848. He was educated at the University of Virginia, and for two years was an instructor there; has been an instructor and assistant professor at the Massachusetts Institute of Technology; since 1875 professor of theoretical and applied mechanics; also since 1883 in charge of the department of mechanical engineering. He is a fellow of the American Academy of Arts and Sciences, a member of the British Association for the Advancement of Science, and of other scientific bodies here and in Europe. He has published 'Applied Mechanics' (1885), and his writings include many papers presented to scientific societies.

Lanzarote, lán-thä-rö'tā, one of the Canary Isles, about 90 miles from the African coast; greatest length, 36 miles; breadth, 15 miles. Its coast is in general very bold, and presents ranges of basaltic cliffs rising in some parts to 1,500 feet; its interior contains several mountains, the loftiest of which has a height of 2,000 feet. The only port of any consequence is Arrecife. Pop., 16,409.

Laoag, lä-wäg', Philippines, capital of the province of Ilocos Norte, Luzon, on the Grand de Laoag River, 4 miles from its mouth. It is picturesquely situated in a fertile plain and is well built; it is open to the coastwise trade and is the centre of shipment for the agricultural products of the region. The name signifies "clearness" from the fact that the sky and atmosphere are almost continuously clear. Pop. 37,000.

Laocoön, lä-ök'ō-ön, a priest of Apollo at Troy. As he was sacrificing a bull to Poseidon on the shore, two serpents swimming from the Island of Tenedos advanced to the altar. The people fled, but Laocoön and his sons fell victims to the monsters. The sons were first attacked, and then the father. Winding themselves round him, the serpents raised their heads high above him, while in his agony he vainly endeavored to extricate himself from their folds. They then retired to the Temple of Pallas Athene, where they took shelter under her shield. The people saw in this omen Laocoön's punishment for his impiety in piercing with his spear the wooden horse consecrated to Athene. The story has frequently furnished a subject to the poets, but it is chiefly interesting to us as having given occasion to a fine work of sculpture—the Laocoön group, now in the Vatican. It was discovered in 1506 on the site of the baths of Titus. Pope Julius II. bought it and placed it in the Vatican. Its preservation was perfect, except that the right arm of Laocoön was wanting: this was restored by a pupil of Michelangelo. This group is of the dramatic Rhodian school, and by no means belongs to the best style of Greek sculpture. Yet it has been much treated of in literature, especially by Goethe, Heine, Lessing, Winckelmann, and Herder. It represents three persons

in agony, but in different attitudes of struggle or fear, according to their ages. Pliny declares it was made of one stone by the sculptors Agesander, Polydorus, and Athenodorus, all natives of Rhodes, and the two latter, probably sons of the former.

Lessing makes it probable that those three artists lived under the first emperors. It may be fairly doubted whether the statue mentioned by Pliny is the same as that we now have; acute observers have found that the group does not consist of one block, though the junctions are carefully concealed. To this it may be answered that they were not perhaps perceptible in the time of Pliny. Several copies have been made; one in bronze, from a model by Giacopo Tatti or Sansovino, which was carried to France. Bacio Bandinelli made a copy which is in the Medici Gallery at Florence. Good casts of the group are to be found in all important collections of statuary. Consult: Lessing, 'Laokoon oder über die Grenzen der Malerei und Poesie' (1880); Robert, 'Bild und Lied' (1881); Kekule, 'Zur Deutung und Zeitbestimmung des Laokoons' (1883).

Laodicea, lä-öd-i-sé'a, the ancient name of four places in Asia Minor. (1) Laodicea, now called by the Turks *Eski Hissar* (Old Castle), an ancient ruined city, once the capital of Greater Phrygia, 120 miles east of Smyrna, the site of one of the seven primitive Christian churches of Asia. Nothing but very extensive ruins of inferior architectural merit remain to point out the locality of this interesting city. (2) See **LATAKIA**. (3) Now Ladik, a city of Lyconia, north of Iconium. (4) An ancient city of Syria, founded by Seleucus Nicator, which stood to the northeast of Baalbec, in a plain watered by the Marsyas.

Laos, lä'ōs, a territory in the Indo-China peninsula surrounded by the Shan states, Anam, Tonkin, and the Chinese province of Yun-nan. Its extent and the number of its inhabitants are unknown, but they have been estimated at one and a half million. The country is intersected by mountain ranges and traversed by the Mekong or Cambodia River, the alluvial valley of which produces abundant sugar, rice, tobacco, etc. Laos exports to the neighboring states a considerable quantity of ivory, gold, silver, precious stones, silk, etc. The inhabitants are reported to be connected with the Burmese in their racial, social, and religious peculiarities. The capital is Ching-Mai.

Laosaurus, lä-ō-sâ'rūs, a genus of unarmored, herbivorous dinosaurs (q.v.) of the suborder *Ornithopoda*, whose remains are found fossil in the Jurassic rocks of western North America.

Lao-tse, lä'ō-tsā, or **Lao-tseu**, Chinese philosopher: b. Kiuh-jin 604 B.C. The date of his death is unknown. He was the founder or reformer of one of the most ancient and important religious sects of China, known as the Tao, or sect of reason. He was a historiographer and librarian to a king of the Chow dynasty; traveled to the borders of India, where he may have become acquainted with Buddhism; met Confucius and reproached him for his pride, vanity, and ostentation; was persuaded to record his doctrines in a book, which he did in the 'Tao-ti-king' or 'The Path to Virtue'; and on

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completing this task is reputed to have disappeared into the wilderness, and there ascended to heaven. According to him silence and the void produced the Tao, the source of all action and being. Man is composed of two principles, the one material and perishable, the other spiritual and imperishable, from which he emanated, and to which he will return on the subjugation of all the material passions and the pleasures of the senses. Lao-tse's moral code is pure, inculcating charity, benevolence, virtue, and the free-will, moral agency, and responsibility of man. Since the 2d century of our era the sect has continued to extend over China, Japan, Cochinchina, Tonquin, and the Indo-Chinese nations.

La Paz, lā pās (Sp. lā pāth), a department of Bolivia, bounded on the north by Brazil, on the east and south by the departments of Beni, Cochabamba, and Oruro, and on the west by Peru. Its area has never been accurately determined; according to a recent conservative estimate it is 75,742 square miles. Extensive tracts in the northern portion are still unexplored, and the boundary disputes with Brazil and Peru add a large element of uncertainty. Calculations based upon the extreme Bolivian claims give the fabulous area of 275,413 square miles. The department is divided into 9 provinces, as follows: La Paz, Yungas, Larecaja, Muñecas, Campolican, Omasuyos, Pacajes, Sicasca, and Inquisivi. Each provincial capital has a municipal council and is administered by a sub-prefect. The provinces are subdivided into cantons, administered by corregidores. The entire department is subject to a prefect, representing the national government. Some of the highest peaks of the Bolivian Andes rise above the great Titicaca basin (itself 13,000 feet above sea-level) in the southern half of this department, which portion has a temperate and moderately salubrious climate (see **LA PAZ**, the capital, etc.). Chief products are copper, silver, tin, gold, coca, wheat, barley, potatoes; in the torrid lowlands of the north, sugarcane, rice, tobacco, and coffee; and from the forests along the tributaries to the Amazon are obtained rubber and cinchona. Cattle and sheep are bred in large numbers on the upland pastures. The census of 1 Sept. 1900 shows the population to be 423,800.

La Paz, Bolivia, capital of the department of the same name, and, temporarily, of the republic (see **SUCRE**). It is the metropolis and commercial centre of Bolivia, situated in the Quebrada del Choqueyapu, 650 feet lower than Lake Titicaca (from which the distance by road is about 45 miles) and yet quite 12,250 feet above the level of the sea. The latitude of La Paz is $16^{\circ} 29' 54''$ S., lon. $68^{\circ} 29' 38''$ W., and mean annual temperature about 50° F., or somewhat less than that of Paris. The annual range of temperature at La Paz, however, is very different from that at Paris, the summers being less hot, the winters less cold, and the extremes of temperature 19.4° F. to 73.4° F. The clearness of the sky occasions rapid loss of heat by radiation; the nights are therefore much colder than the days. Though the thermometer often falls below freezing-point, plants are rarely frozen, for the reason that the air at this great height is very dry. It is a substantially built but unimpressive city with ill-paved streets rising at a

steep grade from the small river which flows through its midst; it has, however, a beautiful Alameda or promenade, a cathedral, many churches, and some noteworthy public institutions—a museum, library, university, professional schools of various kinds, and courts. Up to 1903 the city remained without railway connections, the nearest stations on existing lines of railway being Oruro, terminus of the line from Antofagasta, and Puno on Lake Titicaca; to the latter point a railway was being constructed. Lines of telegraph connect La Paz with Oruro, Cochabamba, Colquechaca, Puno, and Santa Cruz. According to the census of 1900, the population is 57,000.

La Paz, Mexico, capital of the southern district of the territory of Baja California, the capital of the northern district being Ensenada de Todos Santos. It is pleasantly situated between the coast range and the bay, and has commercial dealings principally with San Francisco, Mazatlán, Guaymas, San Blas, and Mzanillo. Pop. 4,737.

Lapeer, lā-pēr', Mich., city and county-seat of Lapeer County, on the Michigan C. and the Grand T. R.R.'s, 60 miles north of Detroit, 45 miles west of Port Huron, and 41 miles south of Bay City. It was first settled in 1836 by A. N. Hart and was incorporated as a city in 1868. The municipal government is administered by a mayor and city council of 8 members elected every two years. The city has four banks, capital \$250,000, and has numerous large factories, stone works, planing mills and iron foundries. The Michigan Home for the Feeble Minded is located here; also the Lapeer Business College, High School, and various church buildings. Pop. (1890) 2,753; (1900) 3,297.

E. T. WOODRUFF,
Editor of the 'Clarion.'

La Perouse, Jean François de Galaup de, zhōn frān-swā dē ga-lōp lā pā-rooz, French navigator: b. near Albi, Languedoc, France, 22 Aug. 1741; d. after 1788. He served in the French navy against England (1778-83) and sailed in August 1785 with two ships on an exploring expedition to the Pacific, and by sailing through La Perouse Strait, between Saghalien and Yezo, discovered that each of these was a separate island. In February 1788 he sailed from Botany Bay; and after this no more was heard from him. In 1826 it was fully ascertained by the English Captain Dillon that both of the French ships had been wrecked in a storm on a coral reef off Vanikoro, an island lying north of the New Hebrides, and in 1898 a few relics of his party were found there. An account of the early portions of La Perouse's voyage prepared from journals sent home by him, was published under the title of 'Journey Round the World.'

La Piedad, lā pē-ā-dad', Mexico, town in the state of Michoacan, near the northern boundary, on the Lerma River, 62 miles southwest of Guanajuato. It is the centre of a large agricultural district. A fine bridge crossed the Lerma at this point. Pop. (1901) 11,200.

La'pis-laz'uli, the sapphire of the ancients, is a highly prized ornamental stone. It was long supposed to be a simple mineral, but now has been shown to be a variable mixture of lazurite, hauynite, diopside, amphibole, musco-

LAPLACE—LAPLAND

vite, calcite, pyrite and other minerals. The most important mineral in the stone is lazurite, which is itself a highly complex compound, essentially $\text{Na}_4(\text{Na}_2\text{Si}_3\text{O}_8)\text{Al}_2\text{Si}_5\text{O}_{12}$, but containing also in molecular combination varying amounts of haüynite and sodalite. Lazurite is usually massive, has a hardness of 5 to 5.5, a specific gravity of 2.45, and rich azure-blue color. This color is characteristic also of lapis-lazuli, which, before the discovery of the artificial ultramarine, was powdered and concentrated into this excellent pigment. Exceedingly costly vases, mosaics, engraved gems and other ornamental objects have been made from lapis-lazuli, it being especially esteemed in Russia. Its most important localities are in Siberia, Persia, China, and Chile.

Laplace, Pierre Simon, pē-är se-môn lä-pläs, MARQUIS DE, French mathematician and astronomer: b. Beaumont-en-Auge (Calvados) 23 March 1749; d. Paris 5 March 1827. He studied the higher mathematics at the academy of Beaumont, in 1767 went to Paris, and there by the influence of D'Alembert became professor of mathematics in the Ecole Militaire. By his brilliant memoirs on the theory of probability he attracted wide notice, and in recognition was elected *membre-adjoint* (1773) and titular member (1785) of the Academy of Sciences. He was appointed examiner in the Royal artillery corps (1784), and professor of analysis at the Normal College (1794); and in 1816, for the elegance of his style in the 'Exposition du Système du Monde' (1796) was admitted to the Académie Française, of which in 1817 he became president. Appointed by Napoleon minister of the interior (1799), he was shortly dismissed, being, according to the Emperor, "below mediocrity as a minister," and aiming to "conduct the government on the principles of the infinitesimal calculus." He was, however, given a seat in the Senate, became its vice-president, and in 1803 chancellor. He also held the post of president of the bureau of longitudes, and was a member of the commission for the establishment of the metric system. Nichol called him the "titanic geometer," and he has been styled also "the Newton of France." Among the more important of his remarkable investigations are the discovery of the inequality in the movements of Jupiter and Saturn; his researches in probabilities (contained in the 'Théorie analytique des Probabilités' 1812, and the 'Essai Philosophique sur les Probabilités' 1814); his improvements in the lunar theory; and his theory of the tides. His chief work is the great 'Mécanique céleste' (1799–1825), a compendious solution of the problems of physical astronomy, and one of the greatest contributions ever made to science. It was translated into English by Nathaniel Bowditch (q.v.) (1829–39), who said: "Whenever I meet the words of *il est aisé à voir* [it is easy to see] I am sure that hours and perhaps days of hard study will be necessary." A collection of Laplace's works in 13 vols. was made by the French government (1878 et seq.). Consult the life by Kaufman (1841); and Arago, 'Biographies of Scientific Men' (in Eng. trans. 1859).

Lapland, an extensive territory in the north of Europe, between lat. 64° and 71° N., and from the shores of Norway east to those of the White Sea; area, about 130,000 square miles,

of which more than a half belongs to Russia; and the remainder is shared in nearly equal proportions between Sweden and Norway. Both from its geographical position and its physical conformation Lapland, or the country of the Lapps, is one of the most forbidding regions of the globe, consisting either of rugged mountains, some of them covered with perpetual snow, and many of them only for a short period free from it, or of vast monotonous tracts of moorland wastes. This extensive territory appears to have been at one time wholly occupied by the people to whom it owes its name; but its southern and better portions have been gradually encroached upon by Norwegians, Swedes, and Finns. The Lapps call themselves Sabme or Sabmeladsjak (the Norwegians call them Finns), belong to the Ural-Altaic stock, and are consequently closely related to the Finns (Suomi). As a race they are the shortest people in Europe (four or five feet in height). They are spare of body, with dark, bristly hair and scanty beard, and short, often bandy, legs. Though not very muscular they are capable of great exertion and fatigue, and frequently live to a great age. The mouth is large, the lips thick, and the eyes small and piercing. The Lapps are usually distinguished as Mountain, Sea, Forest, and River Lapps. The Mountain Lapps, the backbone of the race, are nomads; they move constantly from place to place in order to find sustenance for their reindeer herds, their only source of wealth. In summer they go down to the fiords and coasts, but spend the rest of the year in the mountains and on the plains of the interior. The Sea Lapps, mostly impoverished Mountain Lapps, or their descendants, dwell in scattered hamlets along the coast, and live by fishing. The Forest and River Lapps are nomads who have taken to a settled mode of life; they not only keep domesticated reindeer, but hunt and fish. The nomad Lapps live all the year round in tents. The reindeer supplies nearly all their wants, except coffee, tobacco, and sugar. They live on its flesh and milk; they clothe themselves in its skin, and use it as a beast of burden. It is computed that there are 400,000 reindeer in Lapland, for the most part semi-wild. In his personal habits and in his clothing the Lapp is the reverse of cleanly. He is, however, very good-natured, rather prone to self-indulgence, and miserly and selfish. His imagination is easily excited, and he is readily susceptible to religious impressions of a sensational type; a notable "epidemic" occurred at Koutokeino in Norwegian Lapland in 1848–51. The Lapps all profess Christianity; those of Norway and Sweden belong to the Lutheran Church, those of Russia to the Greek Church. The Norsemen treated the Lapps as a subject race as early as the 9th century, but had to reconquer them in the 14th; the Russians followed in the 11th, and the Swedes in the 16th. From the 13th to the 17th century the Lapps were kept in a state little better than slavery by Swedish adventurers known as Birkarlans. But at the present day both the Scandinavian governments bestow on them every consideration. The number of Laplanders is not supposed to exceed 25,000 of all descriptions, of whom Norway has nearly 15,000, Sweden about 7,000, the rest belonging to Russia. Probably one third of them are nomadic. Consult: Du Chaillu, 'Land of the Midnight

LAPLAND LONGSPUR—LAPWORTH

Sun' (1881); Tromholt, 'Under the Rays of the Aurora Borealis' (1885); 'The Testimony of Tradition' (1890).

Lapland Longspur. See LONGSPUR.

La Plata, lä plä'tä, Argentine Republic, the new capital of the province of Buenos Ayres. The important question of the location of the capital of the republic was not settled by law until Gen. Julio A. Roca became president. By custom, however, Buenos Ayres was the seat of the national government, and of the provincial government as well. This anomaly was ended during President Roca's first term. Congress passed a law by which the city of Buenos Ayres was declared to be the capital of the republic; the legislature of the province of Buenos Ayres decided to build a new city, which should be the provincial capital. The cornerstone of La Plata was laid on 19 Nov. 1882, in a barren waste a few miles from the village of Ensenada and about 24 miles below Buenos Ayres, on the south shore of the Rio de la Plata. The port of La Plata, built in Ensenada, is in communication with the city by means of a railroad and a canal, which is navigable by seagoing vessels. In less than three years from the date of its foundation the new capital had a population of 30,000, and, in addition to the public buildings, 3,631 brick and stone houses were either completed or in course of construction. It is said that the public buildings alone have cost about \$40,000,000. The city is laid out on the same plan as Washington, D. C., with diagonal avenues 97½ feet wide, streets 58½ feet wide; and 23 public squares. Among the principal buildings are: the Government House, Treasury Department, Capitol, City Hall, Police Department, Provincial Bank, Hypothecary Bank, Bourse, Department of Engineers, Department of Justice, Museum and Public Library, Astronomical Observatory, Great Central Railway Station, etc. There are several handsome churches, two theatres, and a race-course. Railways connect this port with nearly every province of the republic. Permanent residents in 1901 numbered 35,410, and in addition there is a large floating population.

La Plata, Rio de, rē'ō dā, an estuary on the southeastern coast of South America, between Uruguay and Argentina; an outlet for the united waters of the Paraná and Uruguay rivers. The enormous outflow, which in volume is exceeded only by that of the Amazon, creates powerful currents; treacherous shallows are formed over the washings brought down from the interior of the continent; and the low-lying southern shores afford no shelter from storm winds. Therefore navigation in this estuary, which is 143 miles wide at its mouth, and about 190 miles long, narrowing gradually above Montevideo and Buenos Ayres, combines the perils of river and open sea. On the north shore there is one good natural harbor—that of Montevideo; on the Argentine side well-directed efforts are being made to supply natural deficiencies by building massive docks, dredging deep-water channels, and completing other extensive harbor improvements (see ARGENTINA, BUENOS AIRES, and LA PLATA). The region to which the Rio de la Plata, with the Uruguay, Paraná, and Paraguay rivers, gives access, is of vast extent. In the later years of Spanish dominion it was comprised in the viceroyalty of

La Plata, from which the states of Argentina, Uruguay, Paraguay, and Bolivia have been carved; and to-day the southern portions of that region sustain some of the most progressive of all Latin-American communities. Early in the last century Great Britain attempted to secure control of this continental gateway, a position which, as it now appears, would have enabled her to win in the south a colony possessing very great resources—another Canada, at least. In 1806, when England and Spain were at war, Spain being the ally of Napoleon, Major-General William Carr Beresford, with about 1,600 men, arrived off Buenos Ayres, and captured the city quite easily. But a few weeks later the invaders were driven out. A much larger army, commanded by General Whitelocke, was sent in 1808 to recapture Buenos Ayres, and a separate force succeeded in taking possession of Montevideo. But the British were defeated on the south shore; General Whitelocke capitulated on the day of the attack, withdrew to his ships, and surrendered Montevideo.

MARRION WILCOX,

Authority on Spanish America.

Laporte, la-pôrt', Ind., city and county-seat of Laporte County, on the Chicago & W. M., Lake Erie & W., and several other railroads; 59 miles east of Chicago. It is the farming trade centre for the county; and is also engaged in the manufacture of woolen goods, agricultural implements, wheels, hubs, etc. It is an attractive summer resort, having several beautiful lakes in its vicinity; contains a handsome court house, city hall, St. Rose's Academy, and public library; and has an electric-light plant, waterworks supplied from one of the lakes; several churches, National and State banks, daily, weekly, and monthly periodicals, and an assessed property valuation of nearly \$4,000,000. In the winter large quantities of ice are cut at the lakes here and shipped to Chicago. Pop. (1890) 7,133; (1900) 7,126.

Lap'wing, a plover (*Vanellus vanellus*) found throughout temperate Europe and Asia, across the whole breadth of which it breeds. In the summer a few are found as far north as Norway, Iceland and Greenland, and in winter they migrate for the most part to Africa, and India. In its habits the lapwing much resembles the American killdeer; and, like that bird, it is hated by gunners on account of its alarm-cries. This pursuit and the market demand for its flesh, and more especially for its eggs, have greatly reduced its numbers, especially in Great Britain. The lapwing is noteworthy for the long flowing crest on the head, the contrasting white and deep iridescent green of its plumage, and for its peculiar jerking, yet rapid flight.

Lap'worth, Charles, English scientist: b. Faringdon, Berkshire, 1842. He was trained as a schoolmaster at Culham College, taught at Galashiels, Scotland, 1864 to 1875, at St. Andrews, 1875 to 1881, and at Birmingham University. In 1892 he became president of the geological section of the British Association in Edinburgh. His great work has been in the field of theory with regard to 'rock-fold,' and the investigation of graptolites. Among his works are: 'The Geological Distribution of the Rhabdophora' (1880); 'Intermediate Text-Book of Geology.'

LARAMIE — LARCOM

Laramie, lär'a-mē, Wyo., city and county-seat of Albany County, on the Laramie River and the Union Pacific railroad; 58 miles west of Cheyenne, the State capital. It is the shipping and trade centre for a large stock-raising and mining section; and is also engaged in manufacturing; has large deposits of gold, silver, lead, graphite, antimony, cinnabar, and other minerals, and rolling mills, lime-stone quarries, plaster mills and railroad and machine shops. It is the seat of the University of Wyoming, the State fish hatchery, Agricultural Experiment Station, and the State penitentiary; contains public and college libraries and St. Joseph's Hospital; and has electric light plants, water-works, daily and weekly newspapers, and an assessed property valuation of over \$1,500,000. Laramie was first settled in 1867 by employees of the Union Pacific railroad, incorporated in 1869 and chartered as a city in 1884. The municipal government is vested in a mayor and a council of six members elected biennially. Fifty per cent of the population are American born, 20 per cent Scandinavian and 10 per cent German. The city owns and operates the waterworks. Pop. (1890) 6,388; (1900) 8,207.

W. E. CHAPLIN,
Editor of the "Republican."

Laramie Mountains, a Rocky Mountain range which extends through Wyoming and Colorado, and bounds the Laramie Plains on the east. The highest point is Laramie Peak, 10,000 feet high. Coal is the principal mineral found in this range.

Laramie Plains, a plateau in southern Wyoming, about 7,500 feet above sea-level.

Laramie River, an important stream rising in northern Colorado and flowing into the North Platte at Fort Laramie in Wyoming. Its length is about 200 miles.

Larceny, the fraudulent appropriation of the personal property of another person without that person's consent. To constitute this crime the removal of the goods to any distance is not necessary, but it requires to be shown that the article has completely passed, for however short a time, into possession of the criminal. Concerning the kinds of things the appropriation of which is larceny, the common law restricted them to personal property as distinguished from real estate, but this distinction has been largely abolished by recent statutes. At one time in Great Britain the punishment for grand larceny was death; later it was restricted to transportation; now the punishment for larceny is imprisonment, the same as in the United States, and depends on the previous character of the prisoner. See also THEFT.

Larch, a genus (*Larix*) of coniferous trees characterized by a pyramidal habit of growth; small linear leaves arranged in clusters upon the older branches, singly and spirally upon the young twigs, often conspicuous pistillate flowers which develop small, erect, globose or oblong cones, the attenuated scales of which are not deciduous at maturity. The species, of which there are less than a dozen, are natives of the colder parts of the northern hemisphere. The best known one in the United States is the American larch, hackmatack or tamarack (*L. Americana*), which grows generally in wet, peaty soils and shallow swamps, or occasionally

upon drier upland soils, from Hudson Bay to Pennsylvania, and westward to Manitoba and Illinois. It attains a height of 60 or more feet, and has nearly horizontal branches. Its wood is hard and very durable, but light in proportion to its size. Being very straight and slowly tapering, the trunks are much used for telegraph poles, scaffold-supports, fence-posts, railway-ties, and in ship-building. It is less planted for ornamental purposes than the following species because its branches are less pendulous and less leafy.

The European larch (*L. decidua* or *L. europaea*) grows usually upon dry uplands and a wide range of soils, but rarely in moist ground. Its range is from the mountains of southern Europe to the far north, where it is among the few hardy trees; in Asia it has a similar distribution. In height it exceeds the tamarack, often reaching 100 feet, and since it is of rapid growth, and is used for an even larger number of purposes than the preceding, it is often planted for commercial purposes, windbreaks, and for ornament. The timber which is rich in resin and is practically exempt from insect attacks, is valued for wet situations. It is little used for planks because it warps badly. Since it does not ignite readily and does not splinter it was largely used in wooden battle-ships. Its bark, which contains tannin, is somewhat used for making leather; its stems yield Orenburgh gum resembling gum arabic; and its leaves in warm climates exude Branon manna, a sweetish, turpentine-flavored manna (q.v.).

The other species more or less resemble the foregoing in habit and uses. The most beautiful and ornamental is probably *L. leptolepis*, a native of Japan. It attains heights of 70 and 80 feet and is remarkable for the brilliant autumn colors of its foliage. All the species except the Himalayan larch (*L. griffithii*), which seldom exceeds 40 feet in height, are hardy throughout the United States. The timber of the western larch (*L. occidentalis*), a native of the Pacific Coast region from Oregon northward, is considered the best yielded by coniferous trees. The tree is the largest of the genus, often reaching a height of 150 feet.

The only insect seriously harmful to the larch is a sawfly (*Nematus erichsonii*), whose young hatch in early summer from eggs previously inserted into the young shoots, and immediately begin feeding upon the leaves. This pest is occasionally sufficiently numerous to defoliate large tracts of forest.

Larcom, Lucy, American poet: b. Beverly, Mass., 1826; d. Boston 17 April 1893. In her youth she was a factory girl in Lowell, Mass., and to the 'Lowell Offering,' a magazine conducted by the operatives in the cotton-mills, made contributions which attracted the favorable notice of Whittier. For three years she studied at Monticello Seminary (Godfrey, Ill.), for six taught in Wheaton Seminary (Norton, Mass.). She was editor-in-chief of 'Our Young Folks,' a Boston magazine, later merged with 'St. Nicholas,' in 1865-74. She edited several collections of verse, and published 'Ships in the Mist, and Other Stories' (1859); 'Poems' (1868); 'An Idyl of Work, a Story in Verse' (1875); 'Childhood Songs' (1877); and 'Wild Roses of Cape Ann, and Other Poems' (1880); 'A New England Girlhood Outlined from Memory,' an autobiography

LARD—LARK

(1899). Her collected poetical works appeared in 1884. Her poems of New England life were especially effective, perhaps the best-known being ‘Hannah, Binding Shoes.’ Consult: Addison, ‘Life, Letters, and Diary of Lucy Larcom’ (1894).

Lard, the melted and strained fat of swine, which differs in its situation from that of almost every other quadruped, as it forms a thick, distinct, and continued layer betwixt the flesh and the skin, somewhat like the blubber in whales. The greater part of the finer sorts of the lard of commerce is procured from the abdominal part of the animal. Lard is rather soft, white, and readily fusible at 100° F. It consists of stearine, which is a solid, and oleine, which is a liquid fat; but it usually contains small quantities of impurities, and it is to them probably that it owes its becoming occasionally rancid. It is used as a lubricant, but it is sometimes mixed with oils of better quality as an adulterant.

Larderel'ite, a native hydrous borate of ammonium, crystallizing in the monoclinic system, and having the composition $(\text{NH}_4)_2\text{O} \cdot 4\text{B}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$. It occurs at the Tuscan lagoons, and was named for Larderel, a Tuscan borax manufacturer. The mineral gives off ammonia when heated, and is used, to a certain extent, as a commercial source of ammonia.

Lard'ner, Dionysius, Irish physicist: b. Dublin 3 April 1793; d. Naples 29 April 1859. He was graduated from Dublin University in 1817 and was made professor of astronomy and physics in the University of London in 1828. From 1840 to 1845 he lived in the United States, where he gave popular scientific lectures in many towns. He wrote several notable mathematical treatises; and edited, himself becoming one of the chief contributors, a ‘Cabinet Cyclopaedia’ (134 vols., 1829–46). Among his other writings are: ‘Manual of Electricity,’ etc. (1841); ‘Treatise on Heat’ (1844); ‘The Steam Engine’ (1852); ‘Natural Philosophy and Astronomy’ (1851–2).

Lareau, lä-rō', **Edmond**, Canadian author: b. St. Gregoire, Quebec, 12 March 1848; d. 1890. He was educated at the College of Ste. Marie de Manoir, at Victoria College, and at McGill University, and was admitted to the bar in 1870. In 1876 he became professor of law in McGill University, and in 1886 was elected in the Liberal interest to the provincial legislature from Rouville County. His works, written in French, include histories of Canadian law (1872), and literature (1874), and ‘Historic and Literary Miscellanies’ (1877).

Laredo, lä rá'dö, Texas, city, county-seat of Webb County; on the Rio Grande, and on the Mexican N., the International & G. N., and the Rio Grande & E. P. R.R.'s; about 150 miles west of San Antonio. It is situated in an agricultural and stock raising region, and in the Rio Grande coal belt, with valuable iron ore deposits in the vicinity. Laredo was settled by the Spaniards in 1767, and was incorporated in 1848. The Spaniards found here Indians who tilled the soil and built houses. The early missionaries established here a mission some years before a permanent settlement was made. The chief manufacturing establishments are extensive con-

centrating and sampling works, brick yards, furniture factories, foundry and machine-shop products, stock-yards, grain-elevators, and large coal yards. It is the trade centre for a large section of the southwestern part of Texas. It is connected with Nuevo Laredo, on the Mexican side of the Rio Grande, by bridges. Some of the prominent buildings are the court-house, the jail, the Mexican National Hospital, the Mercy Hospital, and the Ursuline Convent. It is the seat of the Laredo Seminary, established in 1882, under the auspices of the Methodist Episcopal South Church, and the Ursuline Academy. The park of 65 acres is an attractive feature of the city. Pop. (1890) 11,319; (1900) 13,429.

Lares, lä'rēz, a class of deities among the ancient Romans. Their worship was closely connected with that of the Manes, but only the spirits of good men were honored as lares. All the household lares were headed by the *lar familiaris*, who was revered as the founder of the family, and when the latter changed their residence he accompanied them. In the mansions of the rich the images of the lares had their separate department, the *lararium*; in the dwellings of the lower classes they generally stood upon the hearth in a kind of shrine. When the family took their meals some portion was offered to the lares, and on festive occasions they were adorned with wreaths.

Lari'at. See LASSO.

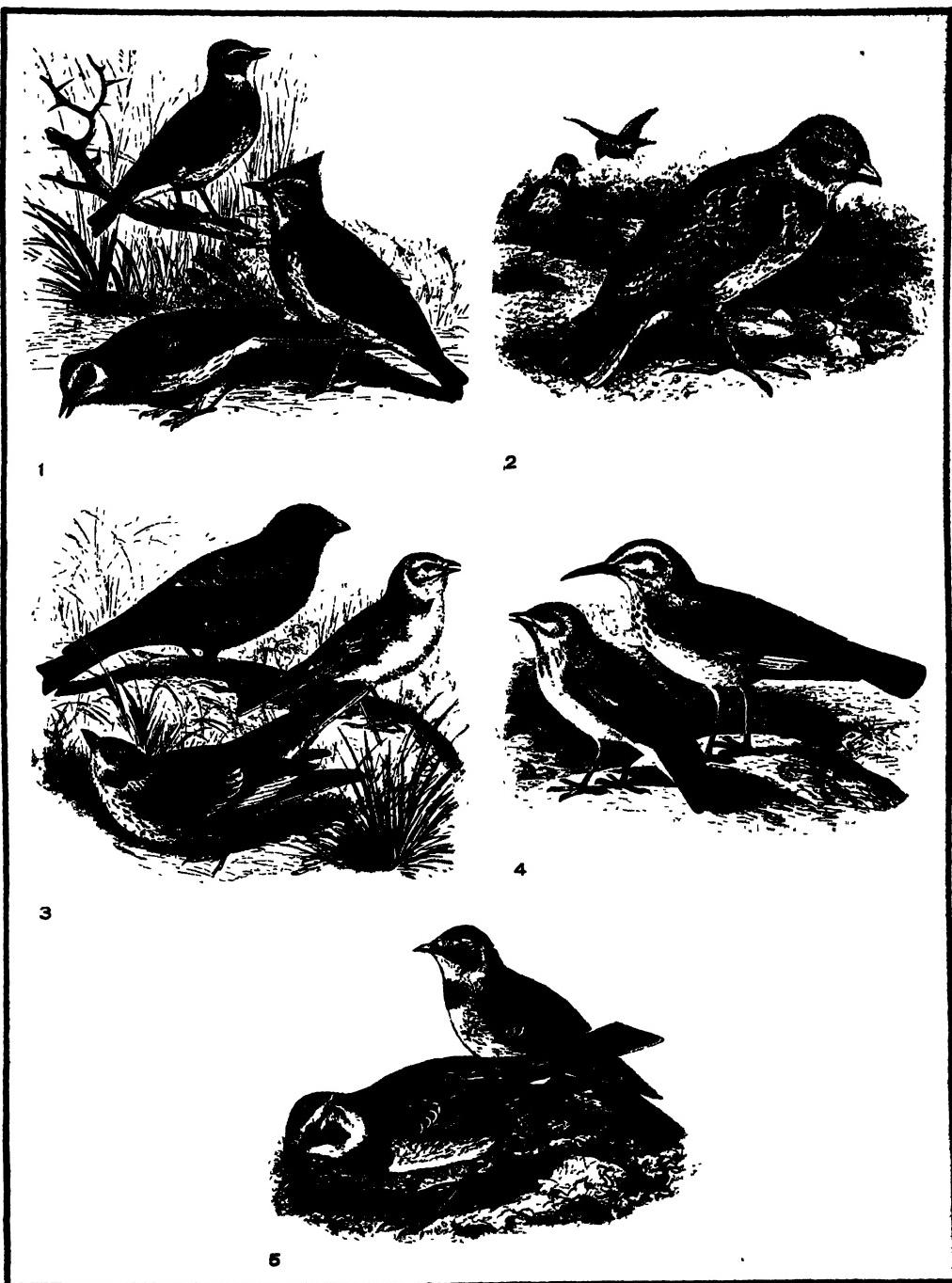
Lar'idæ, the family of sea-going birds which includes the skuas (*Stercorariae*), gulls (*Larinæ*), skimmers (*Rhynchopinæ*), and terns (*Sterninæ*); but some naturalists regard the skuas and skimmers as each of family rank. They are practically cosmopolitan, although the great majority are restricted to sea-coasts and islands.

Lariosaurus, lä-r-i-ō-sā'rūs, a genus of fossil reptiles, of the family *Nothosauridæ*, allied to the plesiosaurs, which were lizard-like in shape, rarely a yard long, and had heads of moderate size with numerous prehensile teeth. Nearly complete skeletons of *L. balsami* are obtained from the black Triassic shales near Lake Como, and from the German Muschelkalk. Consult Woodward, ‘Vertebrate Paleontology’ (1898).

Larissa, lä-rēs'ä, Greece, city in Thessaly, on the Salamvria River, 35 miles northwest of Volo, with which it is connected by railway. It was celebrated in ancient times for its bull-fights, and was the rendezvous place of Julius Caesar's army before the battle of Pharsalia. It is now the largest, richest, and most populous city in Thessaly, and the seat of a Greek archbishopric. Pop. 15,373.

Lark, a bird of the family *Alaudidae*. Larks are small, ground-keeping birds, with small awl-like beaks, the long tarsi scutellated posteriorly, and the claw of the hind toe usually greatly lengthened; the wings vary much in length, but are usually short, as also is the tail. The normal coloration is light brown with darker longitudinal streaks, the under parts being whitish and the breast usually spotted. There is frequently a crest, or decided blackish marks about the head; while the desert forms are, as usual, pale and ornamented. Larks dwell in open grassy places, making their nests on the

LARKS.



1. Wood-lark, Sky-lark and Crested Lark.

2. *Alanda calandra*

3. *Alanda yeltoniensis*, *A. sibirica*, *A. brachydactyla*.

4. Desert Larks.

5. Horned Lark.

LARK-BUNTING—LA ROCHEFOUCAULD

ground or among rocks, sometimes elaborately; and laying spotted eggs; they are sociable, but hardly gregarious. Some frequently perch on trees, and most of them soar while singing, as is well known of the sky-lark (q.v.); and the song of many resembles that of this renowned musician. It is a physiological peculiarity of the family that larks molt only once a year. The food consists of insects and their larvæ, worms, small seeds, buds, berries, etc. The flesh of all is considered a dainty, and great numbers are caught annually on both sides of the Mediterranean to be sold in the markets. The family includes about 100 species, divided among about a dozen genera, of which only one, *Otocorys*, with probably but a single species (the horned lark, q.v.) is found in America, and only a single species occurs in Australia. The remainder of the family belongs to Europe, Asia, and Africa, where familiar types are the sky-lark and wood-lark (qq.v.).

The name is also given to many more or less similar birds of other families, as to several of the pipits and Old World warblers; while the meadow-lark (q.v.) of the United States is a starling.

Lark-bunting, a fringilline bird of the western plains of the United States, the male of which in summer is solid black, except a conspicuous white patch on the wings, and the female brown-streaked. The habits of the pair are terrestrial, and the male soars in singing after the manner of the sky-lark and with some similarity in notes. A very different bird, one of the smaller plains sparrows (*Chondestes grammacus*), is known as the lark-finches. Consult Keyser, 'Birds of the Rockies' (1902).

Larkspurs, a genus (*Delphinium*) of annual and perennial herbs of the order *Ranunculaceæ*, characterized by palmately lobed or divided leaves, and showy racemes or panicles of large irregular flowers. Many of the species, of which there are about 60 in the north temperate zone, are cultivated for ornament, and have developed numerous improved varieties, some of which are double-flowered. The most popular annual species is *D. ajacis*, which attains a height of about 18 inches and bears showy blue or violet, sometimes white flowers throughout the summer. Of the perennial species, *D. formosum*, *D. grandiflorum* and *D. hybridum* are most popular in America, and have yielded the largest number of horticultural varieties. They are all natives of Asia, become two to four feet tall, blossom during mid-summer, and are noted for their beautiful tints of blue, their hardiness and ease of cultivation. If cut down immediately after flowering they often blossom a second time before frost. Among the best known American species are *D. mensisii*, *D. scopulorum* and *D. nudicaulis*, which range from the Pacific Coast to the plains region; and *D. exaltatum*, *D. tricorne* and *D. carolinianum*, found most commonly east of the Mississippi. The larkspurs thrive best in rich, deep, sandy loam well exposed to the sun. The annuals are propagated from seed, as are many of the perennials, which are also increased by cuttings taken in early spring or from second growth in summer. Established clumps may be divided in fall or spring. Since the seeds are very slow in germinating they are usually sown in autumn out of doors, or in early winter in a greenhouse.

Larned, lär'néd, **Augusta**, American author and journalist: b. Rutland, N. Y., 16 April 1835. She was educated at the Watertown and Potsdam seminaries and at Spiegel Institute, New York; has been contributor and correspondent to periodicals; editor of the 'Revolution' (woman's rights); editorial writer for the 'Christian Register,' Boston, for many years; and is author of the 'Roundabout Road' series of papers which appeared in the New York *Evening Post*. She has also published 'Home Stories'; 'Talks with Girls'; 'Tales Retold from Grecian Mythology'; 'The Norse Grandmother'; 'Tales from the Eddas'; 'Village Photographs'; and 'In Woods and Fields.'

Larned, Josephus Nelson, American author and librarian: b. Chatham, Ontario, Can., 11 May 1836. He was a member of the editorial staff of the Buffalo *Express* 1850-69; and editor, 1869-72; he was then superintendent of public education in Buffalo for a year, and in 1877 became librarian of the Buffalo Library, a position which he held for 20 years. He was president of the American Library Association in 1893-4. He edited and published (1902) 'The Literature of American History,' a bibliography, in which the "scope and comparative worth" of each book is indicated in short annotations by historical students. His other works include 'Talks about Labor' (1877); 'History for Ready Reference' (1895); 'Talk about Books' (1897); 'History of England for Schools' (1900); 'A Multitude of Counselors' (1901); and 'Primer of Right and Wrong' (1902).

Larned, Walter Cranston, American lawyer and author: b. Chicago 30 Nov. 1850. He was graduated at Harvard in 1871; studied at the Harvard Law School, 1871-2, and in Europe, 1872-4; was admitted to the bar in 1874, and has since practised in Chicago. He is the author of 'Arnaud's Masterpiece: a Romance of the Pyrenees'; 'Churches and Castles of Mediaeval France'; and 'Rembrandt: a Romance of Holland.'

Larned, Kan., city and county-seat of Pawnee County, at the junction of the Arkansas and Pawnee Rivers, 240 miles southwest of Topeka. It is on the Missouri P. and the A. T. & S. Fe R.R.'s, and is the shipping centre of a large farming and stock-raising country. It has flour mills, grain elevators, machine shops and other industries and has electric light and waterworks. The city is governed by a mayor and council elected every two years. Pop. (1890) 1,861; (1900) 1,780.

La Rochefoucauld, François, frāñ-swā lä rōsh-foo-kō, DUC DE, PRINCE DE MARCILLAC, French courtier and moralist: b. Paris 1613; d. there 17 March 1680. He entered on a military career and was engaged as an officer at the age of 16 at the siege of Casale. In the wars and intrigues of the Fronde he served the party of the parliament, took part in the defense of Bordeaux (1650), and at the end of the civil war abandoned the pursuits of ambition for a life of repose and reflection. His house became a resort of the most distinguished wits and people of culture of the time, Boileau, Racine, Molière, Madame de Sévigné, and Madame de La Fayette. The first fruits of his literary activity were his 'Mémoires sur la Régence d'Anne d'Autriche,' a spirited representation of that time, published

LA ROCHEJACQUELEIN—LARVA

1662. In 1665 appeared anonymously the work by which he is now universally known, 'Réflexions, ou Sentences et Maximes Morales,' which passed through five editions in the course of the author's life and has been frequently republished. The best recent editions of the Maximes are those of Gilbert and Gourdault (1868-83), and Pauly (1883). The fundamental and prevailing thought in the book, that self-interest is the mainspring of all human actions, is presented with so much piquancy and variety of aspect that the reader forgives for a time the liberator of his race. His 'Correspondence' appeared in 1818. Consult Rahslede, 'Studien zu La Rochefoucauld' (1888); Bourdeau, 'La Rochefoucauld' (1895); Hemon, 'La Rochefoucauld' (1896).

La Rochejacquelein, Henri Du Verger, öñ-ré dù vér-zhá lá rôsh-zhák-läi, COMTE DE, French Vendean royalist: b. Chatillon 20 Aug. 1772; d. Nouaille 4 March 1794. On the outbreak of the Revolution he retired to La Vendée, and the peasants of La Vendée having taken up arms in the royal cause, he placed himself at their head, and addressed them in the short and pithy harangue: "Let us go to meet the enemy; if I draw back, kill me; if I advance, follow me; if I die, avenge me." After gaining 16 victories in 10 months he fell at Nouaille, shot by a Republican soldier whom he was offering quarter.

La Rochelle. See ROCHELLE, LA.

Larousse, Pierre, pé-är lá-roos, French encyclopædia maker: b. Toucy, Youne, 23 Oct. 1817; d. Paris 3 Jan. 1875. For several years he compiled educational text-books. In 1864 appeared the first volume of his great library of information, anti-clerical in tone, 'Grande Dictionnaire Universel du XIX. Siècle.' It was in 15 volumes, and was followed by an 'Encyclopédie du XVIII. Siècle.' He published also small condensed editions of the large works. His native town raised a statue to him in 1894.

Lar'rabee, William Clark, American Methodist Episcopal clergyman and educator: b. Cape Elizabeth, Maine, 1802; d. 1859. He was principal of Methodist academies at Cazenovia, N. Y. (1831-5), and Kent's Hill, Maine, and in 1837 was a member of the Maine geological survey. In 1840 he was appointed professor of mathematics and natural science in Indiana Asbury (now De Pauw) University, and in 1852-4 and 1856 was superintendent of public instruction in Indiana. He worked efficiently toward the improvement of educational methods in his denomination. Among the works published by him are: 'Scientific Evidences of Natural and Revealed Religion' (1850); 'Wesley and his Co-laborers' (1851); 'Asbury and his Co-laborers' (1853).

Larrabee, William Henry, American editor: b. Alfred, Maine, 20 Sept. 1829. He was graduated from Indiana Asbury (now De Pauw) University in 1845, was admitted to the bar but never entered practice, was assistant editor of 'The Methodist' of New York in 1862-5 and again in 1870-7, was associate editor of the Brooklyn *Daily Union* in 1865-70, and associate editor of the 'Popular Science Monthly' in 1879-1900. He contributed extensively to periodicals and encyclopædic publications, and wrote, with A. J. Schem, a 'History of the War in the East' (1877).

Lar'va, the young of an animal, when it differs from its parents in form and manner of life. In most invertebrates and in some of the lower vertebrates, the animal hatched from the egg is so different from the adult that in many cases the relationship was long unsuspected by naturalists, and the little creatures were given names as separate beings,—*zoëa*, *nauplius*, etc., now applied to the forms of larvæ they represent. These larvæ may grow by imperceptible degrees into the stature and likeness of the adult; or they may pass by comparatively sudden changes through a series of more or less different forms, until finally the adult form is reached and retained. In the latter case the development is said to be by metamorphosis (q.v.), most completely and familiarly manifested by insects. Whatever the method, the course of larval growth in its successive stages recalls the phylogeny of its race—that is, the course of its evolution in history. Thus each of the various phases of the larval life of any of the lower animals, like the foetal life of embryos of the higher ranks, indicates probable ancestral forms. Some of the most remarkable larvæ may be mentioned. Among the marine annelids a larva known as the *trochophore* or *trochosphere* (Fig. 1) is common. It has a short

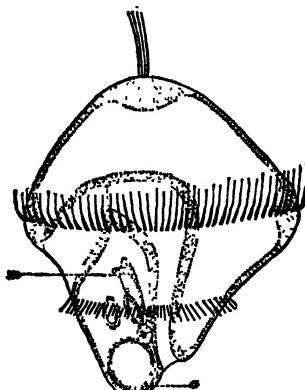


FIG. 1.—A trochophore: *a*, anus; *m*, mouth.

compact body, traversed by the alimentary canal, and has one or more bands of cilia around the body and a sensory patch at the top of the head. By feeding, this larva grows, the increase being chiefly in length, and with this increase, the joining or metamerism of the body, so noticeable in the adult, appears. Other worms have different types of larvæ, among them the *pilidium* of the nemertines (Fig. 2), shaped

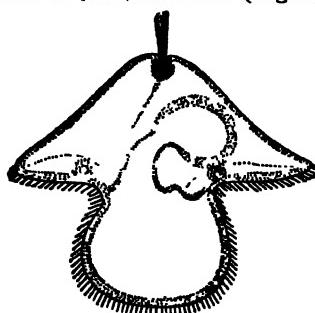


FIG. 2.—A pilidium.

LARVA

somewhat like a chapeau with enormous ear lapets. Between these is the mouth which leads to a large blind sac, the stomach of the worm. The worm itself develops inside the pilidium and later escapes from it to continue its existence, leaving the rest to die.

Among the mollusks larvae like the trocho-phore occur, and it is the existence of these larvae which leads naturalists to think that annelids and mollusks, so different in the adult, had a common ancestry. Later, with the appearance of molluskan characters, a larva known as the *veliger* may appear. This is characterized by a large disk on the top of the head, which serves for a time as a swimming organ and is later lost.

All of the lower and some of the higher crustacea pass through a so-called *nauplius* stage (Fig. 3). The adult crustacean consists of sev-

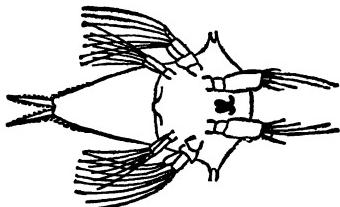


FIG. 3.—Nauplius of *Sacculina*.

eral segments, but the nauplius is without joints, has a single eye, a straight alimentary canal, the mouth being overhung by an enormous upper lip, and three pairs of appendages, which

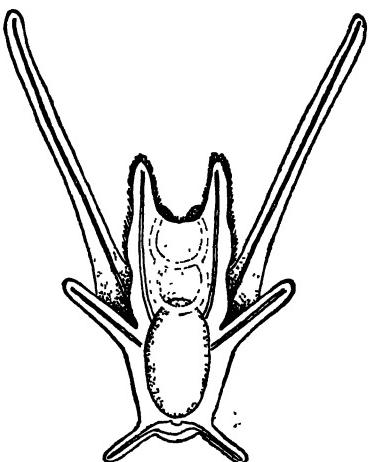


FIG. 4.—Pluteus of a sea-urchin.

later become changed into the two pairs of antennae and the mandibles of the adult. The first pair of the nauplian appendages are simple and apparently are only sensory, while the two remaining pairs are two-branched, and serve as swimming organs, the basal portions being also used as jaws to force food into the mouth which lies between them. In the higher crustacea two other and better developed larvae known as the *soea* and the *megalops* may appear.

Possibly the most remarkable larvae occur

among the echinoderms. These forms, exemplified by the starfish and sea-urchin, are noticeable for their radial symmetry, but in the larvae, of which there are several distinct types, not a trace of a radial arrangement of parts can be found. They are rather markedly bilaterally symmetrical, with well-marked dorsal and ventral surfaces, which, however, do not correspond with the upper and lower surfaces of the adult. Some of these larvae are more or less barrel-shaped, but in others, as the *pluteus* (Fig. 4) and *bipinnaria* (Fig. 5), the body is drawn

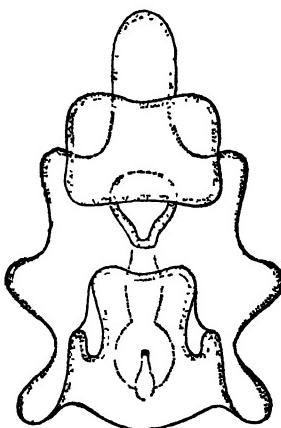


FIG. 5.—Bipinnaria of a starfish.

out into a number of processes, soft and flexible in the latter, but stiffened in the pluteus by internal calcareous rods. The starfish or sea-urchin later arises on one side of this larva, the processes are absorbed and the radial arrangement is superimposed upon the bilateral features in the adult, without, however, completely obliterating them.

The larval forms of insects vary greatly both in their form and in the completeness of their metamorphosis. They may be divided into two classes, the cruciform and the campodea-form. The former include those which are worm-like, such as the caterpillars (q.v.) of moths and butterflies, the grubs of beetles, the maggots of flies, and the like. They are the most numerous and conspicuous forms, and are active and voracious, and do nearly all the damage to be attributed to injurious insects. The campodeaform larvae are those which nearly resemble the parents, such as the nymphs of the dragon-fly and related groups. The second stage of larval life among insects is a very different existence, usually stationary and quiescent, and is called the pupa stage (see PUPA). Some larvae among insects and elsewhere may breed,—a phase of reproduction called paedogenesis (see PARTHENOGENESIS).

The value of the different forms and habits of life assumed by animals in passing through the larval stage or stages is that it tends to prevent the extinction of the species, since if at any moment all the adults were swept out of existence, the young living in a different station would continue to represent and revive the species. "This law is seen to hold good among the insects," as Packard points out, "where many species are represented in the winter-time

LARYNGISMUS STRIDULUS — LASALLE

by the egg alone, others by the caterpillar, others by the chrysalis, while still others hibernate as imagoes. Again, in the marine species, the free-swimming young are borne about by the ocean and tidal currents, and in this what in adult life are the most sedentary forms become widely distributed from coast to coast and from sea to sea." On the other hand, the larval forms of fixed marine animals serve as food for fishes, especially young fishes and numerous invertebrates, which, without this resource, would starve.

Among vertebrates larvae are rare, and appear only in the lower forms, those of the lamprey (*Ammocetes*), of eels (*Leptocephali*), of certain salamanders (*axolotls*), and of frogs (tadpoles), being the most noticeable.

J. S. KINGSLEY,
Professor of Zoology, Tufts College.

Laryngismus (lär-in-jis'mus) **Stridulus.** Laryngismus is spasm of the glottis, causing contraction or closure of the opening; laryngismus stridulus (also called Kopp's asthma, Miller's asthma, etc.), is spasm of the glottis usually associated with some disease, especially with the common ailment of children known as rickets.

Laryngitis, lär-in-jítís. See NOSE AND THROAT.

Laryngoscope, lä-řing'gō-sköp, an instrument used for examining the larynx. It consists of a little plane mirror attached to a stem, about four inches long, at an angle of 120° or more. This mirror is introduced into the mouth of the person to be examined, and held near the back of the throat, while a strong light is thrown upon it from a reflector worn upon the forehead, or held between the teeth of the examiner. In the strong light of the sun, or of an argand burner, the light thrown from the reflector is concentrated upon the laryngeal mirror, which lights up the parts to be examined, while it at the same time reflects the images of these parts into the eye of the examiner. In this way the mechanism of the human voice may be studied, and what is of considerable importance, disease if present can be readily detected, and the fitting remedy applied. The chief merit of introducing this instrument in a very complete form into medical practice must be assigned to Drs. Turck, of Vienna, and Czermak, of Prague, although Garcia, Liston, Babington, Avery, and others used a reflecting mirror to explore the recesses of the throat. It was not until the two German physiologists took up the subject in 1857 that the benefits arising from its use were fully recognized.

Laryngotomy, lär-ing-göt'ō-mí. See BRONCHOTOMY.

Larynx, the organ by which the voice is produced, situated at the upper part of the trachea or windpipe. The larynx is formed mainly by two pieces of cartilage, called the thyroid and the cricoid, one placed above the other. The thyroid is formed of two extended wings meeting at the middle line in front of a ridge; above and from the sides two horns project upward, which are connected by bands to the hyoid bone, from which the larynx is suspended. The thyroid cartilage rests and is movable upon the cricoid, moving backward or forward, but not from side to side. The cricoid cartilage is shaped like a signet-ring (Greek

krikos, a ring), the narrow part of the ring being in front. The cricoid carries, perched on its upper edge behind, the arytenoid cartilages, which are of great importance in the production of the voice. These various cartilages form a framework upon which muscles and mucous membranes are disposed. The mucous membrane which lines the larynx is thrown into various folds. These folds are called the true vocal cords, and by their movements the voice is produced. They are called true, as distinct from the false vocal cords which are above them, but take no part in producing the voice. The true vocal cords projecting toward the middle form

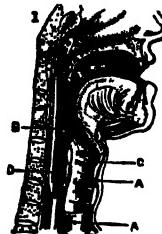


Fig. 1.
Larynx internally.

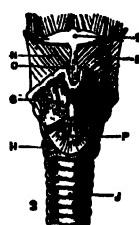


Fig. 2.
Larynx externally.

a chink, which is called the glottis. By the contraction of various muscles this chink can be so brought together that the air forced through it throws the edges of the membrane into vibration and so produce sounds. Variations in the form of the chink will effect changes in the sound. Thus the production of voice is the same as in musical instruments, the arrangements in the larynx being such as to produce (1) the vibratory sounds, (2) to regulate the sound, (3) to vary the pitch, and (4) to determine the quality of the sound. The rapid, delicate muscular movements involved are produced by nervous stimuli reaching the muscles from the brain. Thus the voice is produced in the larynx, and is modified by the rest of the respiratory passages. (See VOICE.) In the act of swallowing, the glottis is covered by a cartilaginous plate called the epiglottis. In the accompanying cut, Fig. 1, shows c, the larynx internally, b being the epiglottis situated above the glottis or entrance to the larynx, a the trachea, and d the cesophagus or gullet. In Fig. 2, j is the trachea, b the hyoid bone, n the thyro-hyoïd membrane, o the thyro-hyoïd ligament, g the thyroid cartilage, h the cricoid cartilage, p the crico-thyroid ligament. See NOSE AND THROAT.

La Salle, Jean Baptiste de, zhōn báp-test dē là säl, French priest and educator, called the father of modern pedagogy: b. Rheims 30 April 1651; d. Saint-Yon 7 April 1719. After completing the preparatory course of humanities, he entered the university of his native city where, at the age of 19, he took his Master's degree. Shortly afterward he went to the Seminary of Saint Sulpice at Paris; and, while living there, followed the theological courses of the Sorbonne. On Easter eve 1678, he was ordained priest, being already a titular canon of the Cathedral Church of Rheims; two years later, in 1681, after defending a thesis before the faculty of the University of Rheims he obtained the degree of Doctor in Sacred Theology.

A man of means and academic culture, he was also a friend of the people, a true philan-

LA SALLE

thropist, giving away all his patrimony in alms to help the deserving poor. He interested himself at an early period in education, especially the education of children belonging to the humbler classes. He noticed that nowhere was there a clear distinction drawn between primary and secondary education and that nowhere was there any provision made for instructing school-children in subjects of acknowledged utility to them in after life.

To correct this state of affairs he founded in 1681 a society of teachers under the name of Brothers of the Christian Schools (q.v.), enjoining them by rule to take the vows of religion but not to enter holy orders. By this latter regulation, he sought to free them from ecclesiastical duties so that they might be able to devote themselves unreservedly to the work of education. The rules and constitutions of the society were approved in 1724 by Pope Benedict XIII.

The first great change introduced by De la Salle and successfully carried out by his followers was the substitution of French for Latin as the language of the class-room. As in the case of antecedent reforms, this roused a swarm of wrathful critics; but it soon met with the approval of the universities and highest authorities in church and state.

The individual system of teaching was then in vogue, and as it seemed to him to involve loss of time and to favor idleness, he replaced it by the "simultaneous" method in which the teacher addresses himself to a numerous division and frequently to a whole class at a time. He insisted on the Socratic method of teaching for all subjects, rejecting the lecturing style as unsuited to elementary instruction. He also recommended the frequent use of object-lessons. Such thorough-going changes gave a great impetus to education inasmuch as it increased the efficiency of the teacher while diminishing his drudgery, and insuring substantial results. In due time, these bold innovations in educational methods brought about a general system of popular education in France as well as in other European countries, and merited for their author the title of Father of Modern Pedagogy.

In 1684 he opened a *Séminaire de Maîtres d'Ecole* for the formation of competent masters for the rural districts, which seminary was the first normal school or training college founded in Europe. Admission was by examination; and during the course, opportunities were afforded for practice-work by the free schools attached to the institution. In his endeavors to instruct the masses and educate the people, De la Salle established in Paris in 1699 regular public courses in science and art in which instruction was given to all comers on Sunday from 12 to 3, the session being always concluded by a short religious instruction. These schools were called *Ecoles Dominicales* and were, in some respects, the prototype of our Sunday schools. At Saint-Yon, near Rouen, he also founded a school of higher studies in which the students were allowed to select the courses best adapted to their wants.

De la Salle lived to see his society firmly established in France and his educational work appreciated at home and abroad. Among his published writings are *Le Devoir du Chrétien* and *La Conduite des Ecoles*; others are of an ascetical character and refer to the religious life.

This great educator and benefactor of the people was of a gentle yet firm disposition; severe to himself but kind and encouraging to others. The holiness of his life was proclaimed to the world by Pope Leo XIII. who on 24 May 1900, conferred on him the honors of canonization and enrolled him among the saints of the Catholic Church.

BROTHER POTAMIAN,
Manhattan College, New York.

La Salle, René Robert Cavalier, ré-nâr-kô-bär-ka-vâ-lê-ä, SIEUR DE, French explorer: b. Rouen, France, 22 Nov. 1643; d. Texas 20 March 1687. He sailed for Canada in 1667 with the hope of making his fortune there; became a fur trader at La Chine (so named for its supposed position on the route to China), explored Lake Ontario, established forts on the St. Lawrence, and was made by Frontenac commander of a fort which stood where Kingston, Ontario, now stands. Returning to France he received large grants of land in Canada, and was ennobled, but on the discovery by Marquette of the Mississippi, he left his new estate to seek the mouth of the great stream. His designs were favored by the French minister of marine, who supplied him with men and ships. In 1679 he had built and launched on the Niagara River a bark of 60 tons, the Griffin, crossed Lake Erie, and Lake St. Clair, and reached Green Bay. Here he loaded the Griffin with rich furs and sent it to meet the claims of his creditors at Montreal. He then proceeded in bark canoes and reached the banks of Lake Peoria. Leaving his lieutenants to continue explorations he returned to Fort Frontenac, where he learned of the wreck of the Griffin, and another ship sent with supplies for him from France. In the meantime his little band of explorers had been scattered through dissensions, but he succeeded in gathering them and descended to the mouth of the Mississippi, where he built a fort, and named the adjacent lands Louisiana. This was the great achievement of his life. After a visit to France he failed on his return (1684) with 4 vessels and 280 men, to locate the mouth of the Mississippi. He had a difference on this point with Beaujeu, the naval commander, who persisted in sailing on to Matagorda Bay. Here La Salle, to avoid further quarrels and recriminations, abandoned his companions; the colonists who followed him lost most of their supplies in a gale of wind, but managed to fortify the fort of St. Louis; they failed in their agricultural attempts, and sought in vain for gold. Their numbers were reduced to 35, and in 1687 he set out for a return to Canada. Two men, Dubant and L'Archevêque, who had embarked capital in the enterprise, were incensed at its failure, and in a quarrel murdered the nephew of La Salle, who, when he enquired into the matter, was shot dead from ambush.

Lasalle, la-säl', Ill., city in Lasalle County, on the Illinois River, the Illinois & Michigan Canal, and on the Illinois C. and the Chicago, R. I. and Pacific R.R.'s; 99 miles southwest of Chicago. It is the centre of a large trade by river, canal, and rail; is in a rich bituminous coal region; and is engaged in coal mining, zinc smelting and the manufacture of sulphuric acid, hydraulic cement, sewer pipe, bottles, clocks and ornamental pressed brick, and common brick. It is the seat of Saint Bede College and Saint Mary's Hospital; has a public library;

LA SALLE COLLEGE—LASSALLE

good sewerage system, waterworks, hospitals, a National bank, electric light and street railroad plants, and daily and weekly newspapers. The city was settled in 1830, and named in honor of La Salle, the explorer. It was chartered in 1852. The government is vested in a mayor and council. The city owns and controls the electric light plant and waterworks. Pop. (1890) 9,855; (1900) 10,446.

La Salle College, an educational institution in Philadelphia, Pa., founded in 1867 under the auspices of the Roman Catholic Church. It is under the management of the Brothers of the Christian Schools. In 1903 there were 24 instructors, 276 students, 8,700 volumes in the library, and the grounds and buildings were valued at \$250,000.

Lascar, läs-kär', a name generally applied to Indian sailors on board of British ships, as, for instance, the large steamers of the Peninsular and Oriental Company. The Lascars make good seamen, being both temperate and docile. They are mostly Mohammedans.

Las Casas. See CASAS, BARTOLOMÉ DE LAS.

Las Cases, Emmanuel Augustin Dieudonné Marin Joseph, èm-män-oo-él ö-güs-tán dè-é-döñ-nä mä-rän zhô-zéf läs käs, French historian; one of the companions of Napoleon at St. Helena: b. Chateau Las Cases, near Revel, 1766; d. Passy-sur-Seine 15 May 1842. He was educated at the school of the Oratorians in Vendôme, and at the military and naval schools of Paris, and when the Revolution broke out took part with the royalists. After the defeat of the Prussians in Champagne he fled to London, where he lived as a teacher. While here he executed his 'Atlas historique et géographique' (1802), which he published under the name of Le Sage. When the émigrés were recalled by Napoleon, Las Cases returned to Paris. Having entered the army of Bernadotte (1809) he gained the favor of Napoleon, who in 1810 made him chamberlain and count of the empire. After the disasters of Leipsic and Moscow, Las Cases commanded the 10th legion of the national guard. In 1814 he refused to assent to the request for Napoleon's abdication, and went to England, whence he subsequently sent in his adhesion to the Bourbons. After the return from Elba he went back to France, and after the final defeat of the emperor at Waterloo followed him to St. Helena. Here with his son he devoted himself to the care of Napoleon, and passed his evenings in recording the emperor's remarks, which were subsequently published in his 'Mémorial de Sainte Hélène, ou Journal où se trouve consigné, jour par jour, ce qui a dit et fait Napoléon pendant dix-huit Mois' (1822-3). Having written a letter to Lucien Bonaparte commenting freely on the treatment to which Napoleon was subjected, he was arrested, 25 Nov. 1816, sent to the Cape of Good Hope, presently taken to England, thence conveyed to the continent, and to Frankfort-on-the-Main, where he at last received his liberty after 13 months' captivity. He was not allowed to return to France until the death of Napoleon. In the reign of Louis Philippe he was elected in 1831 and 1839 to the chamber of deputies, taking his seat at the extreme left, or with the ultra opposition. He wrote, in addition to the works above mentioned, his own life,

'Mémoires d'E. A. D., Comte de Las Cases, communiqués par lui-même' (1819).

La Serena, lä sâ-râ'nâ, Chile, city, and capital of the department of Coquimbo (q.v.), on the Pacific coast, 215 miles north of Valparaíso. A railroad connects it with Coquimbo, 8 miles distant. Pop. (1900) 16,561.

Lasker, läs'kér, Eduard, German politician: b. Jarotschin, Posen, 14 Oct. 1820; d. New York 5 Jan. 1884. He was of Jewish descent, and after being educated at the Universities of Breslau and Berlin obtained a post in the municipal court (1851). He spent three years in England. On his return he entered the government service and was elected in 1865 to the Lower House. He sat subsequently in the Constituent North German Diet, and up to the time of his death in the North German and German Diet for the district of Saxe-Meiningen. He was associated with the 'Fortschrittspartei' or Progressives, and in 1866 assisted in forming the National Liberal Party. He took an active part in the civil consolidation of the German empire. Among his writings is: 'Zur Verfassungsgeschichte Preussens' (1874).

Lasker, Emanuel, German chess champion: b. Berlinchen 24 Dec. 1868. He chose mathematics as a profession, but eventually turned his attention to chess, playing with such success that since 1892 he has triumphed over all competitors both in tournaments and duel matches. He has outplayed, without losing a single game, Blackburne, Bird and F. Mieses of Leipsic. In 1892 he won the first prize in the London tournament; and in the International tournament at New York in 1893 beat all the best players, including Steinitz, champion of the world. A decisive match was arranged between him and Steinitz at Moscow and came off December 1896 and January 1897. Lasker won by 10 games to 2, 5 being drawn.

Las Palmas, läs päl'mäs, Canárias, the chief town of Grand Canary Island, and seat of the provincial government: an attractive place, with clean streets, a few handsome public buildings and churches, shaded walks, a well-defended small harbor, and a somewhat inadequate water-supply. The principal industries are the building and repairing of vessels, and manufacturing woolen goods, hats, leather, and glass. Population about 12,000.

Lassa, läs'sä. See LHASA.

Lassalle, lä-säl', Ferdinand, German Socialist: b. Breslau 11 April 1825; d. Geneva 28 Aug. 1864. He studied at the universities of Breslau and Berlin, and while there gained the friendship of such men as Böckh and Humboldt. Toward the end of 1844 he met at Berlin the Countess Hatzfeldt, who had contracted an unfortunate marriage, conducted her suit for separation, and brought it to a successful issue. He first made himself known as a leader during the democratic troubles of 1848, and was imprisoned for a year for alleged inciting to revolt. In 1858 he produced a work on the philosophy of Heraclitus, and in 1861 published his 'System of Acquired Rights.' Thereafter he proceeded to organize the working-classes, which caused the government to accuse him of sedition, and he was imprisoned for four months. He was at first allied with the party of the Pro-

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gressists, but in 1862 he broke with them; in 1863 he issued his famous 'Offenes Antwort-schreiben,' a brochure in which he sets forth his working-class programme; and later in the same year founded a Labor Union (Allgemeiner deutscher Arbeiterverein), and began the Socialist propaganda in Germany. In 1864 he published an attack on the Manchester school of economists under the title 'Herr Bastiat-Schultze von Delitzsch der ökonomische Julian, oder Kapital und Arbeit.' In the summer of the same year he was killed in a duel occasioned by a love affair. One of the chief points in his economic theory was that the "iron law of wages" tended always to reduce wages to the mere cost of living; to remedy this he proposed associations of the working classes in productive enterprises with capital furnished by the state. He left no such elaborate statement of his views of the nature of capital and capitalistic society as did Marx; nor did he influence the labor movement so much through his theoretical teachings as through his power and success as an organizer. Consult: Bernstein, 'Lassalle as a Social Reformer'; and Dawson, 'German Socialism and Lassalle.'

Lassell, lā-sē'l, William, English astronomer: b. Lancashire 18 June 1799; d. 5 Oct. 1880. His early education was scanty, and while serving a mercantile apprenticeship at Liverpool he made telescopes for himself, and in a private observatory which he built near that city he began his astronomical work, about 1820, and continued it until 1861. There he built and mounted reflecting telescopes equatorially, the first of the kind in use, and also invented a method of polishing the specula. With his own telescope he discovered the satellite of Neptune in 1847, observed the eighth satellite of Saturn in 1848, and in 1851 discovered two new satellites of Uranus. In 1861, at Valetta, on the island of Malta, he mounted equatorially a reflecting telescope, and at that place until 1865 he made observations, also describing new nebulæ and correcting many of his former results. In 1865 he returned to England, built an observatory near Maidenhead, and there spent the remainder of his life.

Lassen, lās'sēn, Christian, Norwegian philologist and linguist: b. Bergen, Norway, 22 Oct. 1800; d. Bonn, Prussia, 8 May 1876. He studied at Christiania, Heidelberg, and Bonn, at which latter university he became in 1830 extraordinary and in 1849 ordinary professor. With Eugène Burnouf he deciphered many Pali MSS., and the result of their labors was published by the Asiatic Society in an 'Essay on the Pali or Sacred Language from the Peninsula beyond the Ganges.' He published with Schlegel the 'Ramayana' and the 'Hitopadesa,' and was for many years editor of the 'Zeitschrift für die Kunde des Morgenlandes.' His works, which are numerous and valuable, relate to a variety of oriental languages and ancient history, embracing, among other subjects, translations from the Hindu philosophy, the history of Bactriana, Cabool, and India, and cuneiform inscriptions.

Lassen, Eduard, Danish composer: b. Copenhagen 13 April 1830; d. Weimar 15 Jan. 1904. He began his education at Brussels and in 1851 won the "Prix de Rome." Through Liszt

his opera 'Landgraf Ludwigs Brautfahrt' was produced in Weimar (1875), where he was made the following year "Kapellmeister" to the court. He retired in 1895. Of his compositions those which are most remarkable for talent and artistic sincerity are the operas: 'Frauenlob' (1860); 'Le Captif' (1868). He wrote two symphonies, and the music for Sophocles' 'Edipus,' and Goethe's 'Faust,' as well as numerous songs, etc.

Las'so, a long strong thong of buffalo-hide, rope, or leather, with a running noose at one end, used by ranchmen and hunters. It is thrown in such a way as to fall over the horns or head of the animal, the hunter coiling one end round a high pommel on his saddle. When he makes a successful cast the hunter spurs his horse to its fullest speed, and the horse or other animal is almost strangled or borne to the ground, and becomes an easy prey. Instead of a noose a leaden ball may be attached to the end of the thong, which is thrown so as to entangle the legs, neck, or horns of the animal to be captured. The lasso has been used in the South American wars: it was employed against the French sentinels by some of the semi-barbarous tribes whom Russia had pressed into her armies during the Crimean war.

Lasso-cells, or **Stinging Cells**, names applied to the cnidocytes of coelenterates. See NEMATOCYST.

Lassus, lās'ūs, **Orlandus**, or **Lasso**, lās'sō, **Orlando** (originally Roland Delattre), German composer: b. Mons in Hainaut 1520 or 1530; d. Munich June 1594. As a composer he was excelled only by Palestrina among musicians of the 16th century. About 1556 he went to Munich as chapel-master to Albert, duke of Bavaria, and in 1562 became chapel-master, an office which he held till his death. Among his more than 2,000 works are some 60 masses, many madrigals and songs, and the celebrated music for the Seven Penitential Psalms. In the royal library at Munich is the richest collection of his works. His sons published a collection of his motets, entitled 'Magnum Opus Musicum' (1604, 17 vols. folio). An edition of his collected works appeared at Leipsic 1893 (et seq.).

Last Days of Pompeii, The, a celebrated romance, by Edward Bulwer, Lord Lytton, published in 1834. The characters and scenes are suggested by the peculiarities of the buildings at Pompeii. Beginning a few days before the destruction of Pompeii, the story relates principally to two young Greeks, Glaucus and Ione, who are deeply attached to each other. The former is a handsome young Athenian, impetuous, high-minded and brilliant, while Ione is a pure and lofty-minded woman. Arbaces, her guardian, is the villain, who, under a cloak of sanctity and religion, indulges in low and criminal designs. His character is strongly drawn; and his passion for Ione, and the struggle between him and Glaucus, form the chief part of the plot. Nydia, the blind girl, who pines in unrequited affection for Glaucus, and who saves the lives of the lovers at the time of the destruction of the city, by conducting them in safety to the sea, is a touching and beautiful conception. The book, full of learning and spirit, is not only a charming novel, but contains

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many minute and interesting descriptions of ancient customs.

Last of the Mohicans, The, an American novel by James Fenimore Cooper, published in 1826. It formed one of the celebrated Leatherstocking tales.

Last Rose of Summer, The, a famous song by Thomas Moore, published in his 'Irish Melodies.' The air was derived from an old melody, 'The Groves of Blarney.'

Last Sigh of the Moor, The, a large hill in the outskirts of the city of Granada, Spain. It is noted as the spot where Boabdil, the last Moorish monarch, took his farewell of the land of his birth, 2 Jan. 1492.

Las Vegas, läs vä'gä's, N. Mex., city and county-seat of San Miguel County, on the Gallivar River, a branch of the Pecos, and on the Atchison, T. & S. Fe railroad, 83 miles east of Santa Fe. There are here practically two towns, the old Mexican settlement, which is the county-seat, and the modern city lying to the east, first known as East Las Vegas, but incorporated in 1896 as the city of Las Vegas. The New Mexico Normal University is located here, and there is a public library, flour-mills, carriage and wagon shops, railroad machine shops, planning-mills, foundries and machine shop. The surrounding country is devoted to agriculture and stock raising and Las Vegas is an important wool market. The health resort known as Las Vegas Hot Springs is located 6 miles distant, at an elevation of 6,767 feet above the sea. Pop. (1901) 8,000.

Laszow'ski-Ger'ard, MADAME Emily de, Anglo-Austrian novelist: b. Scotland 7 May 1849. She was educated in the Convent of Kiedenburg in the Tyrol, was married to the Chevalier Miecislas de Laszowski, an Austrian lieutenant-general, and resides in Vienna. She published: 'Reata' (1880); 'Beggar My Neighbor' (1882), and other novels, written in collaboration with her sister, Dorothea Gerard, and 'Bis' (1890); 'The Tragedy of a Nose' (1898); 'The Extermination of Love' (1901); and other novels of which she is sole author. Her fiction has been popular both in England and America.

Latacunga, lä-tä-koon'gä, Ecuador, capital of the province of Leon and one of the oldest towns in the republic, containing an administration building, city hall, college, hospital, school for young ladies, five churches, two printing houses, manufactures of woolen and cotton fabrics, potteries, etc. Owing to its situation on a plain more than 9,000 feet above sea-level, it has an even and temperate climate, and the surrounding country is well adapted to agriculture and cattle-raising; but it is only 25 miles distant from the great volcano, Cotopaxi, and has repeatedly been destroyed by earthquakes. Pop. about 12,000.

Latchaw, John Roland Harris, American educator: b. Venango County, Pa., 7 Sept. 1851. He was graduated at Hillsdale College in 1881 and in 1895-6 studied at the University of Chicago. In 1881 he founded Barkeyville Academy in Pennsylvania, and conducted it until 1884, when he became president of Findlay College, where he was also lecturer on psychology and theology till 1893. From 1893 to 1895 he was minister of the First Baptist Church at Zanes-

ville, Ohio; held several other pastorates; was president of Defiance College, 1896-1902, since when he has been president of Palmer University. He has written: 'Outlines of Psychology, Its Method and Matter'; 'Citizenship in the Northwest Territory'; 'Outline Lectures in Theology'; 'Theory and Art of Teaching'; and is editor and publisher of the 'Truth Seeker' and joint editor of 'Unity Herald.'

Lateral Line Organs, a system of sense organs in the lower aquatic vertebrates, so called from the fact that part of the system makes a well marked line on the side of the body of fishes, although a larger but less conspicuous portion of the organs occurs upon the head. In their simplest form, as in the fish *Chimæra*, the organs are placed in grooves, but usually the grooves are closed into tubes with openings at regular intervals by which water obtains access to the canals. The distribution varies considerably in different fishes, but the most constant canals are one along the side of the body, one across the back of the head, and three rows, one above, one below the eye and one on the lower jaw. The sense-organs contained in the canals belong to a group of peculiar structures known as "nerve-hillocks" or "neuro-masts," and are further peculiar in their nerve supply, which is derived from the 7th (facial) and 10th (vagus) nerves. In the case of the amphibia these organs occur only in the aquatic forms. Hence, while they are present in tadpoles, they are lost, and with them their nerves, when the tadpole changes into a frog or toad. This would indicate that their function is in some way connected with an aquatic life, and only very recently has it been shown to be for the recognition of vibrations of low rapidity in the water. There has been accumulated considerable evidence to show that the ears of vertebrates are only specially modified parts of the lateral line system.

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Lat'eran, palace and church at Rome. The name is derived from Plautius Lateranus, head of a rich patrician family whose estates were confiscated by Nero, while he himself was put to death for complicity in the conspiracy of Piso. The palace afterward became an imperial residence, but was given to Pope Melchiades in 312 by Constantine the Great, and became the residence of the popes for a thousand years. Only one fragment of the palace of Constantine remains, the private chapel of the popes, and the end wall of their dining-room. The rest is all recent, the old palace having been rebuilt from designs of Fontana by Sixtus V. In 1438 Gregory XVI. turned it into a museum, and it contains many fine pictures and statues, and mosaics, notably the flooring taken from the baths of Caracalla in 1822 and containing 28 portraits of gladiators. The basilica of St. John Lateran is the original see church of the bishop of Rome. The see church was built by Pope Sylvester, Constantine joining with his own hands in the construction. It was consecrated in 324, overthrown by an earthquake in 896, rebuilt by Sergius III. in 911. This second basilica was destroyed by fire in 1308 and again after rebuilding in 1360, but restored by Urban V. 1370. The church consists of five naves. The transept is the most beautiful part of the building, and the

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many colored marbles, the statues of the Apostles, the Tabernacle, beneath which the skulls of Saints Peter and Paul are said to be preserved, the grand mosaic of the Head of Christ above the arch of the tribune (a work of art attributed to the time of Constantine), are all notable features among the numberless examples of religious art to be found in the building.

Lateran Councils, five councils of the Roman Catholic Church, held in the Church of St. John Lateran, Rome, under the presidency of the pope. The first Lateran Council took place in 1123, under Calixtus II. The Concordat of Worms was confirmed, the indulgences granted to the crusaders by Urban II. were renewed; the consecrations performed by Burdin, the anti-pope, were annulled; the decrees against simony, marriage of the clergy, etc., were repeated. The second (1139), under Innocent II., laid the interdict upon King Roger of Sicily, excommunicated the Petrobrusians, and ordered Arnold of Brescia to keep silent. The third (1179), under Alexander III., decreed that a vote of two thirds of the total conclave should be required legitimately to elect a pope. The fourth, convened by Innocent III. in 1215, is the most important of all the Lateran Councils. Besides representatives of many princes, two Oriental patriarchs were present 412 bishops, and 800 abbots and priors. Seventy decrees were issued. The first, directed against the Cathari and Waldensians, contains a confession of faith, in which the term *transsubstantiatio* occurs for the first time. The second decides the Trinitarian controversy between Petrus Lombardus and Joachim of Floris (in favor of the former). The 13th forbids the foundation of new monastical orders. The 21st decrees that all the faithful shall confess at least once a year to his sacerdos proprius (*Mansi xxii. 953-1086*). The fifth (1512-17), which was not recognized by the Gallican Church, abrogated, on the command of Julius II., the Pragmatic Sanction issued by the Council of Pisa, and approved the concordat between Francis I. of France and the pope by which the "liberties" of the Gallican Church were abrogated.

Consult: Valentini, "Basilica Lateranense descripta ed illustrata" (1839); Buddeus, "De Conciliis Lateranensis," Jena (1725).

Lat'erite, a highly ferruginous, argillaceous rock, found in India. The laterite of the highlands results from the weathering of the underlying volcanic rocks. "Low-level laterite" is the surface-rock of the extensive low lands near the western coast; is formed from the debris of volcanic rocks of the region and of highland rocks.

Latham, la'tham, Robert Gordon, English ethnologist and philologist: b. Billingsborough, Lincolnshire, 24 March 1812; d. Putney, Surrey, 9 March 1888. He was educated at Eton and Cambridge and became professor of English literature in University College, London. He published numerous works on the English tongue, among them a "Treatise on the English Language" (1841; frequently republished); "History and Etymology of the English Language" (1849); "Handbook of the English Language" (1851); "Elements of Comparative Philology" (1862). His principal works on ethnology are: "Natural History of the Varieties of Man" (1850); "Man and his Migrations" (1851); "Ethnology of the British Islands"

(1852); "Ethnology of Europe" (1852); "Descriptive Ethnology" (1859); "Russian and Turk" (1878).

Lath'bury, Mary Artemisia, American author and illustrator: b. Manchester, N. Y., 10 Aug. 1841. She was educated at Manchester and at Worcester, Mass.; after leaving school engaged in teaching art, and subsequently in editorial work; and since 1876 has devoted herself to general literature and illustration. She is author and illustrator of "Fleda and the Voice" (1878); "Out of Darkness into Light" (1880); "Seven Little Maids" (1882); "Ring-Around-a-Rosy" (1884); "Idylls of the Months" (1884); "Twelve Times One" (1885); "From Meadow Sweet to Mistletoe" (1888); "Child's Story of the Bible" (1898); has also published other books, and is well known through her Chautauqua songs and hymns in church collections.

Lathrop, la'thrōp, George Parsons, American author: b. Oahu, Sandwich Islands, 25 Aug. 1851; d. New York 19 April 1898. He was educated in New York and in Dresden, studying in the latter city from 1867 to 1870, when he returned to New York and for a short time studied law. He went to England and there, in 1871, married Rose, second daughter of Nathaniel Hawthorne. (See LATHROP, ROSE HAWTHORNE.) From 1875 to 1877 he was assistant editor of the "Atlantic Monthly"; editor of the Boston *Courier* till 1879; resided afterward at Concord, Mass., and in New York city. Among his writings in prose and verse the following are best known: "Rose and Roof-Tree" poems (1875); "Study of Hawthorne" (1876); "Afterglow" a novel (1876); "A Masque of Poets" (1877); "An Echo of Passion" (1882); "In the Distance" (1882); "Spanish Vistas" (1883); "History of the Union League in Philadelphia" (1883); "Newport" (1884); "Gettysburg, a Battle Ode" (1888); "Dreams and Days," verses (1892); "Gold of Pleasure" (1892). With his wife he published "Annals of Georgetown Convent" and "A Story of Courage" (1894); and he brought out an edition of Hawthorne's works, with a biography (1883). The American Copyright League was founded (1883) by Lathrop.

Lathrop, John (also Lathropp, Laythrop), American clergyman: b. Yorkshire, England; d. 1653. He was educated at Oxford, took holy orders; was rector at Egerton in Kent; and about the year 1624, in London, became minister (succeeding Henry Jacob) of the first Independent and Congregational church organized in England. He and his congregation underwent annoyance and persecution at the hands of churchmen, and for a time (1632-4) Lathrop was imprisoned. During his confinement he was bereft by the death of his wife and by a division in his flock over a question of baptism, and in 1634 sailed to Massachusetts, where he settled as minister at Scituate, removing in 1639 to Barnstable. The records of these towns kept in "an original register" written by him are referred to as authority by Prince in his "Annals of New England."

Lathrop, John Hiram, American educator: b. Sherburne, N. Y., 22 Jan. 1799; d. Columbia, Mo., 2 Aug. 1866. He was graduated at Yale in 1819, from 1822 to 1826 was tutor there; adopted the profession of law, which he fol-

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lowed for six years, then abandoned it for that of teaching. He taught at Norwich, Vt., and at Gardiner, Maine. Between 1829 and 1840 held professorships of mathematics, natural philosophy, law, history, and economics at Hamilton College; was president of the University of Missouri 1840-9; afterward became chancellor of the University of Wisconsin (1849-50); president of Indiana University (1859-60); professor of English literature at the University of Missouri (1860-2). He was again president of the University of Missouri in 1865, and until the time of his death.

Lathrop, Rose Hawthorne, American author: b. Lenox, Mass., 20 May 1851. She was educated in the public schools, having lived during the years 1853-60 in England, where her father, Nathaniel Hawthorne (q.v.), was United States consul at Liverpool (1853-7), and in Portugal; studied art in Dresden and London; and in 1871 married George Parsons Lathrop, with whom, until his death, she was associated in literary labors. She has been especially interested in the improvement of conditions for suffering and needy people, and in 1891 established Saint Rose's Free Home for Cancer, and Rosary Hill Home, in New York, where she afterward became head of a Dominican community of the Third Order and directress of a charitable home, her title being Mother Mary Alphonsa. Besides many sketches and stories, her writings include 'Along the Shore,' poems (1888), and 'Memories of Hawthorne,' with her husband (1897), with whom she also collaborated in other works. See **LATHROP, GEORGE PARSONS**.

Lath'yrus, a genus of plants of the pea family, the vetchlings or everlasting peas, which resembles *Vicia* but have fewer leaflets (usually two), broader petals, an obliquely truncate staminal tube, and a style longitudinally flattened and bearded on the inner face. The species are numerous and grow in sandy and waste places, or in meadows. *L. pratensis*, the meadow vetchling, a climbing plant, two or three feet long, with yellow flowers, is a familiar example throughout the whole northern hemisphere. Another species (*L. maritimus*) the beach-pea, is equally widespread. The roots of *L. tuberosus* are eatable. *L. sativus* and other species are used as green fodder for cattle in India, but are harmful to pigs; and several species contain a poisonous principle injurious to the human system. Nearly 60 species of the genus are cultivated for their handsome flowers—yellow, red, scarlet, purple, and blue. The larger kinds are well adapted for arbors and shrubberies, where they may climb upon some support.

Lat'imer, Hugh, English prelate, reformer and martyr: b. Thurcaston, Leicestershire, about 1490; d. Oxford 16 Oct. 1555. He was educated at Cambridge, took holy orders, and by and by began to preach Protestant doctrine, which led to vigorous opposition. He was made chaplain to Henry VIII. in 1530, and during the ascendancy of Anne Boleyn in 1535 was appointed bishop of Worcester. In 1538 he resigned his bishopric, not being able to accept the Six Articles, and was put in prison, but on the accession of Edward VI. he was released and became highly popular at court. This continued until Mary ascended the throne, when Latimer was

cited to appear, with Cranmer and Ridley, before a council at Oxford, and condemned. After much delay and a second trial, Latimer and Ridley were burned at the stake. His preaching was popular in his own time for its pith, simplicity, and quaintness, and his 'Sermons' are still read. Consult *Lives by Demaus* (1869); R. M. Carlyle (1890).

Latimer, Mary Elizabeth Wormeley, American author: b. London, England, 26 July 1822. She was privately educated and wrote largely for the press. Among her works are: 'Salvage'; 'Princess Amélie'; 'A Chain of Errors'; 'My Scrap-Book of the French Revolution' (1868); 'The Last Years of the XIXth Century' (1901); 'The Prince Incognito' (1902); and 'Talks of Napoleon at St. Helena with General Gourzand' (1903).

Latin America, a general name given to the countries and people in South and Central America; especially those races who come of Latin stock. These include naturally the Mexicans, the inhabitants of Central America and certain islands of the West Indies.

Latin-American Literature. The Rio Bravo del Norte, or Rio Grande, serves as a dividing line between what may be termed "Saxon America" and "Latin America." We of Saxon America are apt to look complacently upon ourselves as considerably in advance of our neighbors to the south, at least in material prosperity. But consider a moment the difference of circumstances under which we have grown. From the discovery of Haiti to the founding of Jamestown was 125 years; to the landing of the Pilgrims, 138. During those years Europe had been growing—England and Holland quite vigorously. The priority of Spain and Portugal was therefore a disadvantage: they reached the Western hemisphere in their intellectual infancy; England in her rough, growing youth.

The American possessions of Spain and Portugal were practically twice as remote as those of England. The English colonists kept close to the eastern edge of the continent, and to navigable waters; the most important settlements in Latin America were far inland, and could communicate with the outer world only by means of pack-mules. The maritime districts of the tropical regions were scarcely habitable by Europeans; and when the colonists moved into the interior, it was to be shaken by earthquakes, or terrified by the blaze of volcanoes. As the quest for gold was the chief motive with the Spaniards, they clustered around the old seats of aboriginal civilization,—the plateau of Mexico, Cundinamarca, Quito, and Lima. Subsequently communities of Europeans were established at Caracas, Santiago de Chile, the mouth of the Plata, and at various points along the Brazilian coast; but these did not attain prominence as literary centres until far into the 18th century. In the mean time, the intervening portions of the continent were pathless expanses of prairie and forest traversed by mighty rivers and lofty mountain ranges.

In the matter of acquiring and settling the new continent, the Church naturally took an active part. In addition to the bishops and the parochial clergy, whose duty was to provide for the spiritual needs of the European settlers, large numbers of the monastic orders were assigned to the conversion of the natives. By

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far the most important of these religious bodies was the Society of Jesus, whose members are popularly known as Jesuits. They were the latest in making their appearance; but their great organizing ability enabled them to outstrip all the rest. It was not long before they had gathered tribes of wandering savages into civilized communities, and they established great cattle ranches and sheep farms, together with mills, workshops, warehouses, and routes of trade. Paraguay became in effect a Jesuit state, until its prosperity and the mistaken notion that there were rich gold mines within its limits raised combinations hostile to the order. The Inquisition was introduced in 1569. It had not only the oversight of faith and morals, but also the control of education and of the admission of books into the country. Such instruction as the "Holy Office" was willing to sanction was with scarcely an exception imparted by members of the monastic orders. The *frailes* in their monasteries taught gratuitously the elementary branches and the prayers of the Church; but these slender advantages were available only in the towns. Boys might also be taught writing and the four operations of arithmetic. As to the girls, they were taught by the nuns reading, prayers, and the use of the needle; a few added music and painting. Aristides Rojas, the Venezuelan historian, has related how the first municipal school was established in Caracas. It was 24 years after the founding of the city, and it required a mission to Spain and two years of lobbying to obtain the royal permission to have a school at all; and its field of usefulness was at first limited to Spanish grammar and rhetoric. Books could be imported only on permits, obtainable with difficulty, after close scrutiny and long delay. An equally strict surveillance was exercised over colonial literary productions; each volume of each edition had to be registered separately, after donating 20 copies to the legal and regal authorities; and the publisher had not even the privilege of fixing the price.

The Colonial Period.—It was in such arid and sulphurous soil as has been described that Latin-American literature had to germinate. The first cultivators had to overcome difficulties unknown to those of happier countries; and it is with a feeling of wonder mixed with reverence that we realize how patiently and successfully they did overcome them. Learning made its first appearance—where alone it could—among the monks. As their special mission was to convert the Indians, they diligently studied Indian languages, customs, and antiquities; and it is to the diligence of these men that ethnologists owe nearly all that is known of the ancient civilizations of Mexico, Peru, and Cundinamarca. Botany and vegetable pharmacy afforded another appropriate field; and the various colonial governments fitted out at different times as many as five botanical expeditions. The students of the mathematics found exercise in geodetic surveys; and a knowledge of mechanics was essential in the working of the mines. Clavijero furnishes a long list of those who had made translations into the native tongues. All with one or two exceptions belonged to the monastic orders; and their studies embraced 15 languages. Humboldt himself saw dictionaries and grammars of 14. Quesada says that printing was introduced into Mexico in 1535, and into

Lima in 1538; and that the first books printed in America were for the use of the Indians. In the remainder of the century there were written or printed 82 books for the religious instruction of the aborigines in Mexico, and 50 for learning the native languages.

In time higher schools, colleges, and universities were established in the principal colonies,—the instructors being, with scarcely an exception, ecclesiastics. The little Jesuit college of Bahia began its dubious existence in 1543, and another and larger one was established at Piratinha in 1554; and the roll of alumni of these two schools contains the most prominent names of early Brazilian literature and jurisprudence. The University of the City of Mexico opened its doors to students in June 1553; and two years later saw the establishment of the University of San Marcos, at Lima. In Ecuador, not to mention several colleges founded in the 16th century, the University of San Gregorio was opened at Quito in 1620; and the famous university of Santo Tomás at Bogotá dates its existence from the year 1627. The University of Chuquisaca (the modern Sucre) in Bolivia, the University of Córdoba in what is now the Argentine Republic, and the College of Santa Rosa which afterward became the University of Caracas, were all founded in the 17th century.

During the three centuries of the colonial period, no part of the world furnished a greater amount of historical material. The single national library of Santiago de Chile contains a catalogued collection of 2,740 manuscripts by the Jesuits alone. The material is indeed somewhat monotonous; and a larger space is devoted to monastic and episcopal interests than accords with our northern tastes. In reading these old authors, one is often reminded of the wide difference between the 16th or 17th century and some parts of the world in the 20th; as when Antonio de Leon Pinela, scholar and poet, historiographer of the Indies, authorized by royal order to lay three continents and the isles of the ocean under contribution for light and knowledge, seriously discusses the gravity of the sin of drinking chocolate on fast-days.

Foremost upon the long roll of early chroniclers stands the princely name of Ixtlilxóchitl, the descendant of the ancient chiefs of Texcoco. Three of the family acquired literary reputations; but the one here meant bore the Christian appellation of Fernando de Alva. His vast knowledge of native languages, songs, traditions, and pictographs procured him employment as interpreter to the viceroy; and about the beginning of the 17th century that ruler employed him to write in Spanish a history of his race. No one was equally qualified. His style alone has earned for him, from Europeans, the titles of the Cicero and the Livy of Anáhuac. His industry and his opportunities were equally great. He was personally acquainted with all the Indian sages—some over 100 years old—who had seen the empire of Motecuhzoma at the height of its glory. His work, in 13 books, began with the oldest traditions, and came down to his own time. The 13th book, dealing with the Spanish conquest, was printed separately in Mexico in 1829; but the whole is now accessible to the general reader in the French translation of Ternaux Compans. Carlos de Sigüenza y Góngora (1645-1700) acquired a high reputa-

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tion for writing a similar history from the materials furnished by Ixtlilxochitl. Although far from being the only native work of importance, that of the Indian prince is the most interesting product of the aboriginal mind. The translator, in his preface, names other natives who attempted history. The most successful of these was Tezozomoc, who wrote (about 1598) a minute and circumstantial history of the Aztec nation. As he and Ixtlilxochitl were not of the same nation, they had their partialities, and do not always agree with each other or with the Spanish chroniclers.

Of the many writers belonging to the monastic orders who made valuable contributions to Indian ethnology and early colonial history, none is more widely known than Francisco Bernardino Sahagún, who went to Mexico as a young man in 1529 and died there in 1590, after spending 61 years in teaching the Indians. He acquired such facility in using the native tongues that he wrote his great work, 'Historia General de las Cosas de Nueva España,' in one of them. It is a fine tribute to his human sympathies and his justice to a fallen race, that his contemporaries accused him of paganism. In the latter part of the 18th century, Francisco Xavier Clavijero (1721-93), a Jesuit and a native of Vera Cruz, spent many years as a missionary among the Indians, acquiring an extensive knowledge of their languages, customs, and traditions. Upon the suppression of the Jesuits he was compelled to leave his country, and he took refuge in Italy, where he wrote in Italian his great work 'Storia Antica del Messico' (4 vols., 1780-3). Although the work is not free from the inaccuracy that belongs to almost everything written in that age and from materials so uncertain, it has been the great storehouse of information regarding the ancient inhabitants of Mexico.

No American historian of his time surpassed the Brazilian Sebastião Rocha Pitta (1660-1738), a graduate of the ancient Jesuit college of Bahia. His great work 'Historia da America Portugueza desde o seu Descobrimento até o Anno 1724' is the outcome of great labor and fidelity. Not a few of the early historical productions were in verse; but these were usually commemorative of some particular event. One of the most extensive of these rhyming chronicles was that entitled 'Elegías de Varones Ilustres,' written by Juan de Castellanos, one of the original *conquistadores* of Venezuela.

Numerous epics, half history, half romance, were written in Latin America about the episodes of the conquest. Of these the 'Arauco Domado' is one of the earliest and most famous. Of all the native American races, the Araucans of Chile possessed in the highest degree those qualities that make up the ideal of manhood.—bodily strength and activity, intelligence, honorable truthfulness, indomitable courage, and love of independence. The Incas had never been able to subdue them; and they resisted the Spaniards with varying results 186 years, when in 1732 their independence south of the Bio-Bio River was acknowledged by treaty. During one of the periods of Spanish success, when Santiago and Valdivia were founded, Diego Hurtado de Mendoza led a party to the conquest of Chiloé in 1558. Among his followers was a young poet, Alonso de Ercilla y Zúñiga, who began by the nightly camp-fires to write a narrative of

the war. Being afterward banished for supposed complicity in some attempt at revolt, he returned to Spain and lived in great poverty; but completed his poem 'La Araucana,' which has been praised as one of the truly great epics of the world. The Peruvian poet Pedro de Oña recast the epic and produced the shorter and inferior 'Arauco Domado.' It is to be regretted that from the fact of their living and writing in Spain, Ercilla y Zúñiga, together with Garcilaso de la Vega, the descendant of the Incas, cannot be reckoned among American authors. Another famous epic dealing with episodes of the conquest is the 'Lima Fundada,' composed by the Peruvian poet Pedro de Peralta y Barnuevo (1663-1743); a man of almost universal genius and attainments, as is attested by his numerous writings upon a wide range of subjects. A Mexican bishop, Bernardo Balbuena, who died in 1627, left a descriptive patriotic poem of great literary worth, entitled 'La Grandeza de México'; a pastoral called 'El Siglo de Oro,' the scene of which is laid in the New World; and 'El Bernardo,' an epic in three volumes.

Brazil presented in the 18th century two epic poets of distinction, José da Santa-Rita Durão and José Basílio da Gama. The former is best known to the present age by his epic 'Caramuru.' The hero, Diego Alvares Correa, is a personage of actual history,—a Portuguese adventurer, who with a number of others was shipwrecked on the Brazilian coast about 1509. They were able to save a good part of their effects, including arms and ammunition; and by the possession of these, Alvares became a powerful chief by the name of Caramuru (Man-of-fire), and played an important part in the history of the early Brazilian settlements. The poet has embroidered the tale with a golden thread of romance by introducing as his heroine the beautiful Indian maiden Paraguassú, the Brazilian Pocahontas. Da Gama's epic, the 'Uruguay,' although containing some fine descriptive passages, is not of equal merit. It is a polemic against the Jesuits, accusing them of trying to found an ecclesiastical empire; and fails to do justice to their civilizing influence.

No other American writer of colonial times was surrounded with such a halo of mystery and glory as Juana Inés de Azbaje y Ramírez (1651-94), more generally known as Sor Juana Inés de la Cruz. Her beauty, genius, and learning were alike celebrated in the most exalted terms; and she was called by her admirers "the Tenth Muse." She was the one peerless star of the viceregal court of Mexico. Suddenly, for reasons known to herself, she forsook domestic ties and the splendors of a court for the seclusion of a convent. But she could not escape from her fame; and the highest dignitaries in Church and state sought the wisdom that dropped from her inspired lips. Her modesty was equal to her other virtues; and when twice elected abbess she declined the honor. Her principal dramas, 'Amor es Laberinto,' 'Los Empeños de Una Casa,' and 'Ovilleros,' treat of love, jealousy, desertion, unrequited affection, and like human themes, and were written prior to her retirement into the religious life.

As is well known, the "Golden Era" of the literature of the Iberian peninsula, which reached its height during the lifetime of Camoens, of Cervantes, and of Lope de Vega, was fol-

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lowed by a period of rapid literary and political decadence extending well into the 18th century. Numerous traces are to be found of an early influence, on the one hand of the Encyclopaedists, and on the other of Rousseau. More important still was the revival of interest in the physical sciences, which was particularly in evidence on the plateaus of New Granada and Mexico.

The pioneer of this movement was José Celestino Mutis, a native of Cádiz, who came to America in 1760 along with Mesio de la Cerdá, then recently appointed viceroy of New Granada. He was made professor of mathematics in the College of Nuestra Señora del Rosario; and it was due to his efforts that the Observatory of Bogotá was built, at that time the finest in the New World. He devoted 40 years to the botany of those regions, and determined the species that yield quinine, balsam of tolu, balsam of Peru, and other valuable products. He was also the patron and instructor of a whole generation of men whose names are honorable in the history of science. Of those none was more famous, or more unfortunate, than Francisco José de Caldas. He was one of the earliest scientists in America to make and record meteorological observations; and he measured with great accuracy the altitudes of Chimborazo and Tunguragua. He accompanied Mutis in his botanical explorations, and in 1804 was made director of the observatory. In 1816, when revolution was all abroad in Spanish America, a Spanish commander, Morillo, took possession of Bogotá. He knew the republican preferences of the professors; and they knew their consequent fate. On bended knees Caldas begged for a year of close confinement prior to his execution, in order that he might finish the great botanical work that had been in progress half a century, and the plan of which he alone understood: but he plead to insensate ears, and he and all the savants who had not effected their escape were butchered.

Meanwhile in Mexico, the astronomical observations of Velázquez y Cárdenas, Alzate y Ramírez, and León y Gama were attracting the attention of the French Academy and the leading astronomers of Europe: the Botanic Garden was established; and the Royal School of Mines and the Academy of Fine Arts were founded,—institutions which earned the unstinted encomiums of Humboldt.

The accession of Philip V., the grandson of Louis XIV. of France to the throne of Spain, was distinguished by the advent of French influences, and the founding of academies and literary societies. The Spanish Royal Academy and the Lisbon Royal Academy of Sciences were established in 1714, and numerous societies, formed upon French or Italian models, sprang up in the Peninsula and the colonies, being especially noticeable in Brazil and the regions of the Plata.

It is in colonial Venezuela that we first meet, on American soil, with the Basques of the Pyrenees—a people that are the living enigma of ethnology, without known kinship among the races of men. Shrewd, energetic, sturdy maintainers of liberty, they came over in great numbers in the 18th century, not to dig for gold, but to clear farms and introduce the culture of cocoa, cotton, coffee, and indigo. To them were largely due the material prosperity of

Venezuela and its readiness to cast off the Spanish yoke. The liberator Simón Bolívar was a Basque, as were many of his principal followers. For the past hundred years the stream of Basque emigration has been toward the region of the Plata, where they have contributed to make the Argentine Republic a second New England; but they are scattered everywhere, and recognized by their industry, thrift, and un-Castilian names, as Icazbalceta, the Mexican archæologist; Narciso Aréstegui of Peru, author of the historical novel '*El Padre Orani*'; the brothers Amunátegui of Chile, authors of '*Los Precursores de la Independencia de Chile*'; Anauazamendi, Arrechaveleta, Goicoechea, etc.

The Revolutionary Period.—The yoke of Spain, however legitimate, had long been felt to be heavy on the neck of her colonies; and the prostration of the Iberian peninsula beneath the heel of Napoleon furnished an opportunity for insurrections, which in 1810 broke out almost simultaneously in Mexico, Venezuela, New Granada, Quito, Chile, and Buenos Ayres. The last viceroys of Mexico and Peru departed in 1821; and the independent empire of Brazil was proclaimed 12 Oct. 1822. That date may be held to close the revolutionary period, considered as a struggle for national independence.

One poet of the revolution, José Joaquín Olmedo of Ecuador (1781–1847), rises far above all others for the sublimity and classic finish of his style, which earned for him the epithet of "the American Pindar"; and it is no exaggeration to say that he possessed a magnificence of rhetoric and a power of patriotic exaltation such as few poets besides the great Theban have exhibited. Olmedo's masterpiece is his '*Canto á Junín*', an epic ode without an equal in the Spanish language. Some of the patriotic poems of Numa Pompilio Llona of Peru are especially fine; and the sonnet to Bolívar by the Peruvian Adolfo García is one of the most beautiful compositions of its kind.

The name of Andrés Bello recalls all that is ripest and best in Latin-American scholarship, statesmanship, and patriotism. The teacher of Bolívar, the personal friend and companion of Humboldt, in the inception of the revolution Bello took his place by the side of his illustrious pupil. He prepared the great civil code that became law in 1855; and wrote treatises on international law, literary history, grammar, rhetoric, philology, pedagogics, and mental philosophy. To crown all, his poetic temperament, added to his clear and comprehensive intellect, made him one of the greatest masters of Castilian verse. His '*Agricultura en la Zona Tórrida*' is a magnificent georgic of the remote south; and not less admired is his '*Oración por Todos*'—suggested by Victor Hugo's '*Prière pour Tous*'.

Of the revolutionary heroes one of the most prolific writers was Carlos María de Bustamante (1774–1848), the author of the Mexican "declaration of independence." During the war he was four times a prisoner. His greatest literary work was a history of the Mexican revolution in six quarto volumes; and he was the author of several other considerable works on Mexican affairs.

The revolution in the region watered by the Plata was illustrated by the names and writings of Mariano Moreno, the disciple of Adam

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Smith; Estebán Lena y Patrón, diplomat, editor, and poet, the author of 'La Libertad de Lima'; the philosophic Juan Crisostomo Lafinur, famed for his beautiful elegy on the death of Gen. Belgrano, the hero of Tucumán; and Vicente López y Planes, who wrote 'El Triunfo Argentino' in honor of the repulse of the English invasion of Buenos Ayres (1806-7), and also composed the national hymn of the republic. During the period under consideration, the literary tone of Brazil presented a more placid character, due to her exemption from the violent contests that were agitating the remainder of the continent. This difference of tone is finely exemplified in the writings of Domingo Borges de Barros, Viscount of Pedra Branca (1783-1855),—more frequently spoken of simply as Pedra Branca.

The Period of Independence.—Of the present 16 independent republics of Latin America, three great countries—Chile, the Argentine Republic, and Brazil—have attained in this century to greater importance than the early seats of aboriginal or viceroyal splendor. Chile had been a doubtful appendage of the empire of the Incas; after the downfall of that dynasty, the brave Araucans contested its possession with the Spanish invaders 180 years; and when at length they were driven to the regions south of the Bío-Bío River, the northern portion was held as a part of the vice-royalty of Peru until the time of the revolution. Independence was secured of the vice-royalty in 1817; and the next few years were taken up with domestic wrangling and political experiments, until the present constitution was adopted in 1833. Since that time there has been continuous progress and prosperity. The settlements in the region of the Plata and its great tributaries were made under unusual disadvantages; and it was only in 1776 that Buenos Ayres was made the residence of a viceroy, whose authority extended over the present Argentine Republic, Bolivia, Paraguay, and Uruguay. The existence of this government was neither tranquil nor durable; and active revolutionary measures were begun in 1813. Independence was secured and a federal constitution adopted in 1825. Half a century of domestic factions and foreign wars succeeded; and now the country has enjoyed 20 years of peace and prosperity, during which its growth has been rapid and healthy.

Politics and literature are much allied in Latin America. The beginnings of revolution had little to do with theories of government or abstract rights of man; they aimed at the immediate ends of free trade and relief from foreign domination. There has always been a tendency to run into dictatorial government. There is a permanent party—including the powerful influence of the Church—in favor of a strong personal government and a large amount of interference with individual interests. At the same time there have been large numbers with the apparent ideal of "every man his own law-giver, judge, and executioner." The contest has been between these parties, over the question of how much government people require. The Church and the older men generally have upheld rule and authority; literary men—the young, enthusiastic, and poetic—have as generally striven for larger freedom.

Writers on Political Science.—The necessities arising from the acquisition of national inde-

pendence caused such subjects as political economy, international and constitutional law, and public education, to occupy a prominent place in the minds of the founders of the new republics. Early in the century, treatises on these topics began to appear which won the encomiums of eminent European authorities. The valuable labors of Andrés Bello have been already referred to. Juan Bautista Alberdi, the Argentine jurist (born 1808), is entitled to take rank in the class of publicists represented in Europe by Guizot, De Tocqueville, and the Mills, and by Kent and Story in the United States. He was the author of the Argentine constitution, and of eight substantial works. A celebrated work of more recent date is 'La Reforma Política' of Dr. Rafael Núñez. He is an ultra-conservative, and his great treatise favors a "paternal despotism." Rafael Seijas of Venezuela is a distinguished jurist who has written ably upon international law; he is also a diligent student of English, French, and Italian literatures, upon which he has given to the public some interesting articles.

After Andrés Bello, few promoters of public education have better earned the esteem of their countrymen than Domingo Faustino Sarmiento, an Argentine born in 1811. While minister to the United States (1865-7) he made a careful study of the school system, and the results of his investigations were given to the world in an essay entitled 'Las Escuelas: Base de la Prosperidad de los Estados Unidos.' He was favored by the personal friendship and assistance of Horace Mann, the best-known educationalist that the United States has ever produced. Sarmiento was president of the Argentine Republic from 1868 to 1874. As a writer he was gifted with great originality and vigor of expression, which make his 'Recuerdos de Provincia' one of the most entertaining books of its kind. His masterpiece is entitled 'Facundo,' in which he presents in a series of glowing pictures a comprehensive survey of the points of difference between civilization and barbarism.

Historians.—History has always been well represented in the literature of Latin America. Most of the States have comprehensive histories, the fruit of much research, and written with careful regard to facts and form. There are also numerous historical works of more limited scope, devoted to certain districts or periods, or gathered around the achievements of individuals.

Father Suárez informs his readers that in collecting material for his history of Ecuador, he examined 10,000 packages of papers filed in the Archives of the Indies in Seville. León Fernández, finding no history of his native state of Costa Rica, set about collecting materials; and in 1881-6 he gave to the world 1,917 closely printed pages of documents, not previously edited, bearing upon the history of a country of less than a quarter of a million of inhabitants, whose first printing-press was set up in 1830. The history of Mexico from the earliest times to the death of Maximilian, by Niceto de Zamacois, fills 18 thick octavo volumes. Lorenzo Montúfar's 'Reseña Histórica de Centro-América'—a mere outline—makes seven volumes royal octavo; and the recent 'Historia General de Chile,' by Diego Barros Arana, comprises 13 octavo volumes. Another Chilean historian, Benjamín Vicuña Mackenna, has written an ac-

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count of a single campaign, 'Historia de la Campaña de Tarapacá,' in two volumes of a thousand pages each; his collected historical works fill 15 volumes. The government of Venezuela is now publishing the historical essays of Arístides Rojas relative to that country in 14 volumes. The third volume of the 'Historia General de la República del Ecuador,' by Suárez, reaches only to the year 1718. Then there are the exhaustive works relating to Peru, of which we may mention the magnificent treatise of Raimondi, cut short in its fourth volume by the author's death in 1892. The tenth volume of the 'Historia de la República Argentina' by Vicente Fidel López has just appeared, and its venerable author is continuing the work with an industry unchecked by the weight of his 76 years.

Among special historical works which even the briefest enumeration would include, the most widely known are probably the twin histories of Gen. Bartolomé Mitre of Buenos Ayres (born 1821), bearing the titles 'Historia de Belgrano y de la Independencia Argentina,' and 'Historia de San Martín y de la Emancipación Sud-Americana.' Special mention should be given to the standard work of Rafael María Baralt of Maracaibo (1810-60), entitled 'Resumen de la Historia Antigua y Moderna de Venezuela,' which Arístides Rojas has more recently supplemented by seven "studies" on various epochs and aspects of the national history. Two histories written by Colombians rank very high; namely, the 'Historia de la Nueva Granada' by José Antonio de Plaza, and the 'Historia de la Revolución de Colombia,' by José Manuel Restrepo. The historical works of Mariano Paz Soldán are characterized by that patient accumulation of facts which is supposed to distinguish German scholarship; his reputation rests more especially upon his 'Historia del Perú Independiente de 1819 á 1827,' and his 'Diccionario Geográfico-Estadístico del Perú.'

Manuel Orozco y Berra gave to the public in 1880 an elaborate account of the ancient nations of Mexico in his 'Historia Antigua y de la Conquista de México,' in which he goes over the whole subject treated by Prescott, and adds a profusion of further details. Vicente Fidel López, author of the large 'History of the Argentine Republic' previously mentioned, has written two historical works of great interest to the ethnologist and antiquarian; they are entitled 'Las Razas del Perú Anteriores á la Conquista,' and 'Les Races Aryennes au Pérou.'

Brazil has produced several historical writers of merit. The standard history is by Fr. Antonio de Varnhagen, and is entitled 'Historia General do Brazil.' His descriptive passages are often particularly fine. He published in 1860 an interesting little book, 'A Caça no Brasil,' — the first of the kind that has appeared in South America, — describing the wild animals and the modes of pursuing them in the great forests and on the plains of that country. Pereira da Silva's 'Historia da Fundação do Império Brasileiro' is one of the standard works of Brazilian history.

Literary Critics.—Opinions on authors and books occupy a larger relative space in Latin-American literature than in that of Anglo-Saxon nations. Criticism deals less with the views and statements of an author than with his manner of presenting them; so by treating literature

as a fine art, along with painting and music, it becomes in itself a fine art, requiring artistic faculties carefully cultivated.

Criticism, as a fine art, has been cultivated in Latin America with surprising assiduity; and includes among its eminent masters such men as Torres Caicedo, Miguel Luis Amunátegui, and Calixto Oyuela, the author of 'Estudios y Artículos Literarios.' Rafael M. Merchán, the Cuban exile, of whom it has been elegantly said that he "writes with a gloved hand and a pen of gold," made his home in Bogotá, and became secretary to the President. His poetic temperament, wide reading, and fine discernment furnish the qualifications that make him above all a critic, and which shine conspicuously in his study on Juan Clemente Zenea and in his 'Estudios Críticos.'

Of all this wealth of critical discussion, no part affords more attractive reading than the works of Martín García Mérou, recently Argentine minister to the United States. They show a wide familiarity with the literatures of Europe and America, a delicate judgment, and that kind of fairness that can appreciate the merits of one with whom he does not agree. His essay on the poet Echeverría may be cited as one of his most thorough studies.

Those most interested in the subject of Latin-American literature are now eagerly awaiting the great work in preparation by Prof. García Velloso, of Buenos Ayres. It is to be a comprehensive history of the literature of the entire southern continent.

Novelists.—The novel did not begin to assume prominence in Latin America until about 1860; and the class of writers whose specialty is prose fiction is still relatively small. Jorge Isaacs, the Colombian poet, is widely known by his 'Maria,' a simple and pathetic story of rural life, a translation of which has been extensively read in the United States. His compatriot Julio Arboleda has given the public a bright contrast to this sombre picture, in his sparkling romance 'Casimiro el Montañés.'

The collection of stories known as 'La Linterna Mágica,' written by José T. del Cuellar, of Mexico, has been deservedly popular. Ignacio M. Altamirano, a Mexican lawyer and orator of pure Indian blood, has left a novel, 'Clemencia,' which for style and pathos has seldom been surpassed. The Mexican historian Orozco y Berra wrote a beautiful novel, 'Escenas de Treinta Años,' relating the experiences of an unfortunate disappointed invalid. Dr. J. J. Fernández Lizardi, generally known by the pseudonym of 'El Pensador Mexicano,' has revived the old Spanish picaresque type of romance in his 'Periquillo Sarmiento.'

The Argentine historian Vicente Fidel López is the author of a thrilling historical novel entitled 'La Novia del Hereje,' the scene of which is laid in Lima in the time of the Inquisition; but the favorite romance of the region of the Plata is the 'Amalia' of José Mármol, one of the most beautiful of modern novels. Chile has produced several noted works of fiction, among which the 'Alberto el Jugador' of the poetess Rosario Orrego de Uribe, 'La Dote de una Joven,' by Vicente Grez, and the historical novel 'Los Héroes del Pacífico,' by Ramón Pacheco, are much admired. 'Contra la Marea,' by the Chilean Alberto del So-

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lar, is one of the most powerful of recent American novels.

Quite a number of romances have been founded upon Indian legends, or tell of Indian life and customs. Two of the best of these are quite recent,—the ‘Painé’ and ‘Relmú’ of the Argentine publicist Estanislao S. Zeballos, who, still young, combines every form of literary activity. The ‘Huincualal,’ by Alberto del Solar, is one of the most able productions of this class, and gives evidence of a diligent study of Araucan customs and character. The Brazilian novelist José Martinião Alencar wrote two famous Indian romances, entitled ‘Iracema’ and ‘Guarany.’ ‘Iracema’ develops the main feature of the story of John Smith and Pocahontas. The other novel tells how a young Indian loves a Portuguese woman. Carlos Gomes has transformed it into an opera which has become well known in Europe, retaining the name of ‘Guarany.’

Besides Martinião Alencar, Brazil has produced during the present century two highly successful writers of prose fiction,—Joaquim Manoel de Macedo and Bernardo Guimarães. Macedo was a doctor of medicine, a professor in the University of Rio, a member of Congress, and a prolific writer in prose and verse. His ‘Moreninha’ (Brunette), published in 1840, undertook for the first time to portray Brazilian society as it really was; it enjoyed extraordinary popularity, as did also his ‘Senhora,’ which some critics consider superior to ‘Moreninha.’ Guimarães is one of the most powerful and original writers of Brazil. ‘Ermitão de Muquem’ is considered his best novel. It is written in three versions or styles: one plain prose, one poetic prose, and one peculiar to the author, like the styles of Bentham and Carlyle. His ‘Seminaria’ is a romance with a tragic outcome, and is directed against the enforced celibacy of the clergy.

Poets and Dramatists.—The Spanish and Portuguese languages lend themselves so readily to versification that the amount of poetry produced is enormous. Juan León Mera published in 1868 a critical history of the poets of Ecuador, at a time when many persons were not aware that that country had ever possessed any. Cortés, in his ‘Parnaso Peruano,’ fills 800 pages with choice extracts from 44 of the leading poets of Peru; and the great anthology of Menéndez y Pelayo, consisting of four large octavo volumes of poetical selections, purports to give “only the very best that Spanish-American writers have produced in verse.”

Four names may represent the different styles of poetry cultivated in Mexico. Manuel Carpio, a physician by profession, was well read in Greek and Roman literatures, and a still more diligent student of Jewish lore. His ‘Tierra Santa’ is a work of great learning, not inferior to Robinson’s ‘Biblical Researches.’ He is best known, however, by his poems; one of which, ‘La Cena de Baltasar,’ shows remarkable descriptive power. Fernando Calderón is distinguished rather by the sweetness than the strength of his verse. The tenderness of his sentiments is well displayed in ‘Herman, ó la Vuelta del Cruzado.’ He was the author of a comedy, entitled ‘A Ninguna de las Tres,’ intended as a satire on those who return from foreign travel only to find fault with everything at home. José Joaquín Pesado has at

once tenderness, sublimity, and classic finish. In ‘La Revelación’ he has essayed to wake anew the harp which Dante swept; and he has given to his countrymen in their own tongue the odes of Horace and the psalms of David, along with some minor poems of rare beauty. Last of all, in ‘Los Aztecas’ he has sought to restore and interpret the hymns, chants, and lost lore of the primitive races of Anáhuac. Manuel Acuña, whose unhappy life extended only from 1849 to 1873, holds the place among Mexican poets that Edgar A. Poe does among those of the United States. In his nervous, delicate nature, poetry was a morbid secretion, like the pearl in the oyster; and he became the self-appointed priest and prophet of sorrow and disappointment. His most noted poems are ‘El Pasado,’ ‘A Rosario,’ and a drama entitled ‘Gloria.’

One of the most enduring masterpieces of Spanish-American verse is ‘Gonzalo de Oyón,’ a beautifully wrought tale based upon an episode in the early history of the country. Its author, Julio Arboleda (1817–62), held the foremost rank among the Colombian writers of the first half of this century. Another Colombian writer who reflects the sentiments of the past is Silveria Espinosa de Rendón, who laments the expulsion of the Jesuits in her ‘Lágrimas i Recuerdos.’ In Bogotá, Antonio José Restrepo is the poet laureate. The most celebrated of his longer poems are ‘Un Canto’ and ‘El Dios Pan’; in which the author shows himself to be a liberalist of the most pronounced type, who writes in utter fearlessness of all absolute rulers for man’s mind, body, or estate.

The extensive writings of Esteban Echeverría (1809–51) contain many passages that are weak and commonplace; but he stands forth as the national poet of the Argentine Republic, reflecting the life and thought found on its vast plains and along its mighty rivers. The productions to which his fame is chiefly due are ‘Avellaneda,’ ‘La Revolución del Sud,’ and ‘La Cautiva.’ The last-named poem, an Indian story of the Pampas, deserves a place by the side of ‘Hiawatha,’ which it resembles in the unaffected beauty of its descriptive passages and the flowing simplicity of its versification. Martín Coronado and Rafael Obligado, two of the leading poets of Buenos Ayres, are disciples of Echeverría, though of different types. Coronado’s verse is impassioned and dazzling; while Obligado’s muse loves the contentment of the family hearth or the shady banks of the majestic Paraná, where the stillness is broken only by the cry of a wild bird or the lazy dip of an oar.

The poems of Arnaldo Márquez and Clemente Althaus of Peru take a very high rank for their beauty and tenderness of sentiment as well as purity of style. The ‘Noche de Dolor en las Montañas’ and the ‘Canto de la Vida’ of the Peruvian Numa Pompilio Llona are compositions which will be admired for centuries. The ‘Romances Americanos’ of the Chilean poet Carlos Walker Martínez, and the ‘Flores del Aire’ of Dr. Adán Quiroga of Argentina, are collections of poems of great merit and originality. Compositions of remarkable beauty will be found in the ‘Brisas del Mar’ of the Peruvian Manuel Nicolás Corpancho, the ‘Armonías’ of Guillermo Blest Gana of Chile, and the ‘Flores Silvestres’ of Francisco

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Javier de Acha of Uruguay, José Batrés y Montúfar of Guatemala, a lyric poet of merit, is one of the most noted satirists of America. Matías Córdoba and García Goyena of Guatemala have been justly compared, as fabulists, to *Æsop* and La Fontaine.

Among Brazilian writers of the 19th century, two representative poets may be selected: Antonio Gonçalves Dias and Domingos José Gonçalves Magalhães. Dias was even more esteemed as a patriot than as a poet; and was much employed by the late emperor in carrying out educational and other reforms, in which that estimable sovereign was deeply interested. The successive issues of miscellaneous poems by Dias are now known collectively as his 'Canteiros,' and won the enthusiastic commendation of the Portuguese critic Herculão. He also left some Indian epics, and the two dramas, 'Leonor de Mendonça' and 'Sextilhas de Frei Antônio.' He was so far honored in his own country that his fellow townsmen erected a statue to his memory, with an inscription declaring him the foremost poet of Brazil. The best productions of Magalhães are a tragedy entitled 'Antonio José ou o Poeta e a Inquisição,' and 'A Confederação dos Tamayos,' the latter an epic founded on an outbreak of the Tamayo and other Indians.

Summary.—On looking across the Rio Grande at authors and books beyond, one is struck by some points that contrast with our northern life. There, public men are writers. Whether it be that political life stimulates literary activity, or that the latter is a passport to the former, presidents, senators, cabinet officers, judges, and ministers plenipotentiary, all write. Many of them read, write, and speak a number of languages.—an accomplishment so rare in Saxon America that an envoy is sometimes sent on an important mission without being able to speak the language of the country to which he is accredited.

Again, the literary men of the far South, with scarce an exception, write poetry as readily as prose. Nothing could be more incongruous than the idea of the average public man in the United States writing poetry. Something is due to the character of the language, that a stranger does not readily appreciate. In Spanish and Portuguese verse the words roll and swell, liquid and lengthy, like the waves of the sea, and tempt one to prolong the billowy movement. Latin-American verse is glowingly descriptive, or plaintive and tender, with an occasional tinge of melancholy; but it all possesses a healthy and natural tone, and has not yet been infected by the morbid unrest and hopeless cynicism that characterize much of the recent poetry of older nations.

The great bulk of the people from Texas to Cape Horn cannot read and write. Great efforts are put forth to remedy this state of things by general education, and much has already been accomplished. In the United States, books are intended for a reading class numbering many millions, and are made as cheap as possible, so as to come within their reach. In Latin America there are no millions to read, and the best books are addressed to a relatively small class. As sales are limited, large works of general interest or permanent value are published or aided by the governments, or by wealthy and public-spirited individuals.

Of the lighter literature of the southern republics, a large part first appears in the various *revistas* and other literary periodicals maintained in all the principal cities. It consists principally of odes, sonnets, short stories, and essays. These essays embrace every variety of subject: the authors traverse—often literally—the Old World and the New, view them geographically, ethnologically, sociologically, and write under such captions as 'A Winter in Russia,' 'The Bedouins of the City,' 'The Literature of Slang,' or 'The History of an Umbrella.' The subjects are generally treated, so as to be pleasant reading, and afford at least as much entertainment as information.

Novelists and dramatists are under a great disadvantage, having no protective tariff to save them from European, and especially French, competition. Editors and managers find translations cheaper and easier to obtain than native productions. There is happily a growing reaction in favor of native writers who represent American subjects as seen by American eyes. When the cultivated public becomes fully aware of the greater genuineness of these domestic productions, native talent will have an ampler field; and there is every reason to believe that it will be prepared to satisfy the fullest demand.

Bibliography.—Silva, 'Os Varões Ilustres do Brasil durante os Tempos Coloniaes' (1858); Wolff, 'Histoire de la Littérature Brésilienne' (1863); 'Lira Americana' (1865); 'Diccionario Biografico Americano' (Paris, 1875); 'América Literaria' (Buenos Ayres, 1883); 'Ensayos Biográficos i de Crítica Literaria sobre los Principales Publicistas i Literatos de la América Latina'; 'Antología de Poetas Hispano-Americanos' (4 vols., Madrid, 1893-5).

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Latin Church. See ROMAN CATHOLIC CHURCH.

Latin Empire. See BYZANTINE EMPIRE.

Latin Language and Literature. See ROME, *Language and Literature*.

Latin Union, The, a political alliance formed in 1865 by France, Italy, Belgium, and Switzerland, which countries entered into an agreement by which the amount of silver to be coined yearly was fixed for each member of the union. The coinage of all the countries was of like character, and to be received without discount on public and private account. Greece joined the union in 1868, Spain in 1871, and Servia and Rumania also became members. Some of the South American states also used the Latin Union coinage. Spain alone of the countries of the union coins a gold piece not used by the others. The unit of coinage in the Latin Union is the franc; it has different names elsewhere, as, in Italy the lira; in Servia, the dinar; in Spain, the peseta; but the value is always the same. It is the most widely circulated coinage system in Europe, being used by about 148,000,000 people.

Latins (*Latini*), the ancient inhabitants of Latium, in Italy. Janus, Saturn, Picus, and Faunus, who were deified by their subjects, are represented to have been the most ancient Latin kings. These ancient Latins formed a league of 30 cities, of which the town of Alba Longa

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became the head. Although Rome was a colony from Alba she became powerful enough in the reign of her third king, to seize upon that city, and raze it to the ground. Under Servius Tullius, Rome entered the Latin confederacy, and in the reign of his successor, Tarquinius Superbus, was acknowledged as head of the league. On the fall of the Tarquins the Latins regained their independence, and struggled long against the republic to maintain it; it was finally lost, however, by the decisive victory of the Romans near Mount Vesuvius (340 B.C.).

Latitude, a term used in astronomy and geography. The geocentric latitude of a heavenly body is its angular distance from the ecliptic, as seen from the earth's centre; its heliocentric latitude is its angular distance from the ecliptic, as seen from the sun's centre. The geographical latitude of a place is the altitude of the celestial pole above the horizon; or it is the arc of the celestial meridian intercepted between the zenith and the equator; its geocentric latitude is the angle at the earth's centre intercepted between the place and the terrestrial equator. To determine geographical latitude, the altitude of the pole is found indirectly from observations of a circumpolar star, or from meridian altitudes of the sun or known stars. At sea the sun's meridian altitude is observed with a sextant, its declination being given in the astronomical ephemeris. See also LONGITUDE.

Latitudina'rian, a term applied to those English divines of Charles II.'s time, who, from opposing strenuously both the High Church party and that of the Dissenters, incurred the enmity of both. It denotes one who commends or sanctions deviations from the strict principles of orthodoxy, and it is frequently used as a term of reproach.

Lati'um, lä'shü-üm, a name given to the residence of the Latins, in Central Italy, on the Tyrrhenian Sea, extending between Etruria and Campania. In the earliest times there was a large laurel grove situated on the coast, at the mouth of the Tiber, which extended as far as the city of Laurentum, to which it gave name. Farther on lay the little river Numicus and the sources of the Juturna; and still farther to the east was situated the city of Lavinium. Ancient Latium was much more thickly peopled and much more highly cultivated than the present Campagna di Roma, to which it pretty nearly corresponds; and it must have been healthier, though it was always considered an unhealthy region.

Latona, lä-tō'nä, was the mother of Apollo and Artemis. During her pregnancy she was persecuted by Hera, by whose command the dragon Python threatened her with death, and the earth was not permitted to allow her a place for her delivery. After long wanderings she found rest on the floating island of Delos. The giant Tityus having attempted to offer her violence, was killed by Apollo and Artemis. Latona is represented as a mild, benevolent goddess, in a sea-green dress. With Artemis she cured the wounded Aeneas, and crowned him with glory. When Artemis fled to Olympus from the anger of Hera, Latona carried to her her quiver and arrows, which she had left behind. She was worshipped chiefly in Lycia, Delos, Athens, and other cities of Greece. In

Crete a festival was celebrated in honor of her, called *Ecdysia*.

Latour d'Auvergne-Corret, Théophile Malo de, tä'ô-fél mälô dé la-toor dô-värn-yé-kor-rä, French soldier: b. Carhaix, Brittany, France, 23 Nov. 1743; d. Oberhausen, Bavaria, 27 June 1800. He early decided to become a soldier, and when the French Revolution broke out was among the first to rally round its standard, and distinguished himself in the army of the Pyrenees. Higher appointments were offered him but he declined, declaring that he was only fit to command a company of grenadiers, and was consequently named by Napoleon "First Grenadier of France." His corps generally made the vanguard, and was called "the infernal column." In 1799 he fought under Massena in Switzerland, and fell while attached to the army of the Rhine. His heart was embalmed and carried in a silver box by one of the company in which he had served; his name was always called, the oldest sergeant answering—"Died on the field of honor." As an author he made himself known by a singular work on the early history of Brittany, entitled, "*Nouvelles Recherches sur la Langue, l'Origine, et les Antiquités des Bretons*" (1792).

La Trappe, lä träp, the name of a Cistercian abbey founded by Count Rotrou of Perche in 1140. It was known as *Notre Dame de la Maison Dieu* and from its situation in a damp unhealthy glen, accessible only by a narrow stony passage was called *La Trappe* ("the trap"). The monks were as distinguished for austerity during the 14th and the 15th century as they subsequently became for licentiousness and violence when they were known as the "Bandits of La Trappe." The monastery, however, passed into the hands of Armand Jean le Bouthilier de Rancé in the middle of the 17th century. This brilliant abbot had early abandoned himself to wordliness, but became converted, introduced Benedictine monks into La Trappe and enforced severe discipline. The brethren rose at 2 A.M., retired at 7, slept on straw, were forbidden wine and flesh, spent each evening some time in digging their own graves, and never spoke excepting to say to each other, "Memento mori." Rancé discouraged literary pursuits but enforced constant manual labor; he died in 1700, and the Trappists were driven out of France by the Revolution. They founded a house at Valsainte, Switzerland, which was destroyed by the French in 1798, but they were again put in possession of La Trappe on the Restoration of the Bourbons. In 1829 the Trappist houses were closed by a royal decree, and all but nine monasteries were suppressed; these, however, were compelled to seek refuge in Algiers 1844, and the United States in 1848, where they established houses in Kentucky and Iowa. Consult: Gaillardin, "*Les Trappistes ou l'Ordre de Citeaux au XIX. Siècle, Histoire de la Trappe depuis sa Fondation*" (1844).

Latrobe, lä-tröb', Benjamin Henry, American architect: b. Yorkshire, England, 1 May 1764; d. New Orleans 3 Sept. 1820. He studied at the University of Leipsic, served in the Prussian army as cornet of hussars (1765-8), became an architect in England, in 1798 was appointed engineer of London, and came to Norfolk, Va., in 1796. He built the James

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River-Appomattox canal and the Richmond penitentiary; removed to Philadelphia, and there designed the bank of the United States, the bank of Pennsylvania, the old Art Academy and other structures; and supplied the city with Schuylkill water in 1800. The Roman Catholic Cathedral at Baltimore is also his work. In 1803 he was appointed surveyor of public buildings in Washington, and later was chosen architect of the Capitol. He effectively introduced the natural products of the States as architectural features, particularly in the corn-stalk pillars with capitals of the ears. After the burning of the capital by the British in 1814, he was appointed to rebuild it, but in 1817 resigned.

Latrobe, John Hazlehurst Bonval, American lawyer: b. Philadelphia 4 May 1803; d. Baltimore 11 Sept. 1891. He was the son of Benjamin H. Latrobe (q.v.). He studied at the United States Military Academy, was called to the bar in 1825, from 1828 until his death was counsel for the Baltimore & Ohio Railway Company, was the founder of the Maryland institute, invented a stove commonly known as the "Baltimore heater," was long identified with the American Colonization Society, and succeeded Henry Clay in its presidency in 1853. He also became president of the Maryland Historical Society, and published a 'Biography of Charles Carroll of Carrollton' (1824), a 'History of Mason and Dixon's Line' (1854), 'Personal Recollections of the Baltimore & Ohio Railroad' (1858), and other works.

Latrobe, Pa., town and borough in Westmoreland County, on Loyalhanna Creek and on the Pennsylvania railroad, 40 miles east of Pittsburgh. It is the centre of a large agricultural district. There are valuable deposits of coal and iron ores and mining is carried on to a considerable extent. Latrobe has a large number of manufactories, including steel works, cork works, paper, flour and lumber mills, glass-houses, brick-yards, etc. Pop. (1900) 4,614; (1903) 5,000.

Latrobite, a mineral named after C. I. Latrobe. It is found massive and crystallized in forms belonging to the triclinic system; but the crystals are not well defined; color, pale pink; scratches glass; specific gravity, 2.8; opaque; lustre vitreous. It is composed of silica, alumina, and lime, being a rare variety of anorthite (q.v.) or lime feldspar. See FELDSPARS.

Latrodec'tus, a genus of spiders of the loose-web building family *Theridiidae*, which contains certain large American species popularly considered poisonous, especially one (*L. mactans*) known in the tropics as the katipo. This spider, according to Emerton, is sometimes half an inch long, with a round abdomen and the whole body black except a bright red spot on the under side and one or more red spots over the spinnerets and along the middle of the back; the small and few males have in addition red vertical stripes on each side. This spider makes a large funnel-shaped nest among loose stones, which may spread out two or three feet. It is found all over the country from Canada to Argentina and Chile, and is everywhere feared, but there is no good reason for considering it any more poisonous than other spiders. Consult: Emerton. 'The Common Spiders' (1902).

Lat'ten, a species of brass used in the Middle Ages for metal work. Mines of latten are mentioned as existing in the time of Henry VIII., and the metal is often alluded to in ancient public records, without students of antiquity being able to determine what metal is meant. Three varieties were distinguished, the *black*, the *shaven*, and the *roll*. That used by English workmen used to be imported from Germany and the Netherlands, the finest kind being known as Cologne plate. Lattners formed one of the recognized crafts of London. In some localities the term is still applied to plate-tin.

Latter Day Saints, The Reorganized Church of Jesus Christ of (anti-polygamist), a continuation of the Church which was organized at Fayette, N. Y., 6 April 1830, with six members. This organization was effected by Joseph Smith, Oliver Cowdery and others. Joseph Smith, who was chosen president, was born at Sharon, Vt., 23 Dec. 1805. Subsequently with his parents he removed to Palmyra, N. Y., where, on the occasion of a religious revival in 1820, while alone at prayer he was visited by a heavenly personage who forbade him joining any of the churches in the neighborhood, as their creeds were all wrong. On the night of 21 Sept. 1823 he was again visited by the angel who told him of gold plates containing an account of the former inhabitants of America, which, with the Urim and Thummim, were buried in a hill near by. He visited this place but was forbidden to remove them at that time. Exactly four years later he was allowed possession of them. With the aid of Oliver Cowdery and others as scribes, and the use of the Urim and Thummim, he completed the translation of the plates, or Book of Mormon, by June 1829. March 1830, three witnesses, Oliver Cowdery, David Whitmer and Martin Harris, were permitted to see and examine the plates. They signed a statement that the voice of God to them declared the record true. Eight other witnesses saw and handled the plates. All these witnesses continued to bear this testimony until death.

From the time of organization the church rapidly increased. In January 1831, the headquarters were established at Kirtland, Ohio; and in the following year a great many located in Jackson County, Missouri, which was appointed the place of Zion. Here they were persecuted and mobbed; and in the fall of 1833, driven from their homes by violence. Three years later, the exiles from Jackson County, joined by the Saints from Kirtland and the east, located in Caldwell County. In 1838 a religious persecution resulted in imprisoning the leaders and driving the body of the Church from the State. In the spring of 1839, no charges having been sustained against the leaders, they were permitted to escape, and soon joined the body of the Church near Quincy, Ill. They purchased the town of Commerce, afterward called Nauvoo, and rapidly gathered there. For five years they enjoyed comparative peace and prosperity.

On 27 June 1844, the Prophet Joseph Smith, and his brother Hyrum, were murdered by a mob at Carthage, Ill. This threw the Church into much confusion. The membership at this time numbered about 150,000. The quorums were as follows: (1) The First Presidency,

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consisting of the President and two counsellors, organized in 1833; (2) The Twelve Apostles organized in 1835, consisting at Joseph Smith's death of Brigham Young, president, Heber C. Kimball, Orson Hyde, Orson Pratt, William Smith, Parley P. Pratt, John Taylor, John E. Page, Wilford Woodruff, Willard Richards, George A. Smith, and Lyman Wight; (3) Seventies, composed of one or more quorums of missionaries of 70 men each, organized in 1835; (4) High Priests, a quorum without definite number, composed of local presidents; (5) Elders, organized into quorums of 96 each. Quorums of priests, 48 each; teachers 24 each; and deacons 12 each. The first bishop was Edward Partridge, ordained in 1831. He died at Nauvoo in 1840 and was succeeded in January 1841, by George Miller, who was acting in 1844.

The question now was, who should succeed Joseph Smith. The prophet himself had chosen and designated his son Joseph; but he, being only 12 years of age, a number of aspirants came forward, the more important being Sidney Rigdon, the only surviving member of the First Presidency; James J. Strang; William B. Smith, one of the Apostles, who, as brother of the prophet, claimed to be guardian for young Joseph, son of the prophet; and Brigham Young, who, together with eight other apostles, claimed the right of the Twelve to lead the Church. Young had the largest following; and in 1846 left Nauvoo for the West. (See MORMONS.) While at winter quarters near Council Bluffs, Iowa, in December 1847, he assumed the presidency of the Church, and led his followers to Salt Lake Valley, where he introduced such doctrines as Adam-God, blood atonement, and polygamy. None of these had been accepted by the Church, or taught by its authorities during the life of Joseph Smith.

In 1851, a number of persons and local organizations, some of whom had stood aloof from all factions, started a movement that resulted in a conference at Beloit, Wis., June 1852. This conference renounced all allegiance to Young, William Smith, Strang and others. At a conference 6 April 1853, seven apostles were chosen. Jason W. Briggs was chosen president and representative of the lawful heir in the presidency. Other officers were chosen, and thus the reorganization of the original Church was inaugurated. At a conference at Amboy, Ill., 6 April 1860, Joseph Smith, eldest son of the Prophet, accepted the presidency of the Church. 'The Saints' Herald,' the official publication of the Church, was commenced 1 Jan. 1860, at Cincinnati, Ohio. It was removed to Plano, Ill., March 1863. Since 1881 it has been published at Lamoni, Iowa. Joseph Smith has been its editor-in-chief since 1865. The Church held annual and semi-annual conferences until and including 1882, when the semi-annual were discontinued. The headquarters were at Plano, Ill., from 1863 to 1881; since then at Lamoni, Iowa. The quorums of the reorganization are organized in the same order which existed at the death of Joseph Smith. The doctrines are the same as promulgated during his life, as follows:

A belief in God the Eternal Father, his Son Jesus Christ, and the Holy Ghost.
That men will be punished for their own sins, and not for Adam's transgression.

That all men may be saved by obedience to the laws and ordinances of the gospel, namely, faith in God and the Lord Jesus Christ; repentance; baptism by immersion for the remission of sins; laying on of hands for the gift of the Holy Ghost; the resurrection of the body; that the dead in Christ will rise first; that men shall be judged, rewarded, or punished, according to the degree of good or evil they shall have done.

That a man must be called of God, and ordained by the laying on of hands of those who are in authority, to entitle him to preach the Gospel, and administer in the ordinances thereof.

In the same kind of organization that existed in the primitive Church.

That in the Bible is contained the word of God, so far as it is translated correctly. That the canon of Scripture is not full, but that God, by His Spirit, will continue to reveal His word.

In the powers and gifts of the everlasting gospel, namely, the gift of faith, discerning of spirits, prophecy, revelation, healing, visions, tongues, and the interpretation of tongues, wisdom, charity, brotherly love, etc.

That marriage is ordained of God; and that the law of God provides for but one companion in wedlock, for either man or woman, except where the contract is broken by death or transgression.

That the doctrines of a plurality and a community of wives are heresies. The Book of Mormon says: "Wherefore, my brethren, hear me, and hearken to the word of the Lord: For there shall not any man among you have save it be one wife, and concubines he shall have none."

That the religion of Jesus Christ, will, if its precepts are accepted and obeyed, make men and women better in the domestic circle, and better citizens, and consequently better fitted for the change that cometh at death.

That men should worship God in "Spirit and in truth," and that such worship does not require a violation of the constitutional law of the land.

The Church has been more aggressive in its fight against the crime of polygamy than any other organization. The local work is divided into the following organizations according to reports of 1903: Two States, Lamoni, Iowa; and Independence, Mo.; both organized in 1901; 74 districts: 62 in the United States, 2 in Australia, 5 in England, 2 in Wales, 2 in Canada, and 1 in Nova Scotia. The reorganization supports Graceland College and a home for the aged, both at Lamoni, Iowa. The reorganization has a membership of about 50,000. It is prosecuting missionary work throughout the United States, the Canadas, Australia, New Zealand, Society Islands, Sandwich Islands, the British Isles, Scandinavia and other countries.

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By H. H. SMITH.

Latticeleaf, lät'-is-lēf, or **Lattice-plant** (also called laceleaf and water-yam), a remarkable aquatic plant (*Aponogeton fenestratus*) of Madagascar, noteworthy for the structure of its leaves. The blade resembles latticework or open needlework, the longitudinal ribs being crossed by tendrils, and the interstices between them being open. The root, which is fleshy, and resembles that of the yam, is farinaceous and edible.

Laud, läd, William, English prelate: b. Reading, Berkshire, 7 Oct. 1573; d. London 10 Jan. 1645. He was educated at Oxford; took priest's orders in 1601; became vicar of Stanford, Northamptonshire, 1607, and rector of West Tilbury, Essex, 1609; was made archdeacon of Huntingdon in 1615 and dean of Gloucester 1616, and as king's chaplain in 1617 accompanied James I. to Scotland, where he attempted to enforce Episcopacy with no success. In January 1621, he became a canon of Westminster and in the following June bishop of St. David's. After the accession of Charles I., Laud was translated in 1626 to the see of Bath

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and Wells, and in 1628 to that of London. In 1630 he was elected chancellor of the University of Oxford, which he enriched with a valuable collection of manuscripts, establishing also a professorship of Arabic. In 1633 he was promoted to the see of Canterbury. In 1634 he instituted rigorous proceedings against all who would not conform to the Church of England, and sought to extinguish all forms of dissent by means of fines, imprisonment, and exile. When the Long Parliament met (1640) the archbishop was impeached for high treason at the bar of the House of Lords by Denzil Holles and committed to the Tower. After three years he was brought to trial, but the lords deferred giving judgment. The House of Commons, however, passed a bill of attainder (January 1644), declared him guilty of high treason, and condemned him to death. He met his end on the scaffold at Tower Hill with great firmness. Consult: S. R. Gardiner, 'The Personal Government of Charles I.' (1871), and 'The Fall of the Monarchy of Charles I.' (1881); and 'Lives' by Hutton (1885); Benson (1887); Simpkinson (1894).

Laudanum, lä'dä-nüm. See OPIUM.

Laudonnière, René de, ré-nä de lō-dö-när, French navigator. Nothing is known of the date of his birth or death. His first appearance is in 1562 when he shared in Ribault's attempt to establish a Huguenot colony at Port Royal in South Carolina. He built a fort and founded a colony in 1564 at a point 12 miles up the Saint John's River, Florida. But his colonists were more men of adventure than of industry and were much molested by the Indians. They eventually compelled him to sanction an expedition against the Spaniards in Cuba. But the colony fell subsequently into such straits that 3 Aug. 1565, when Capt. John Hawkins reached Fort Carolina, as they had named their settlement, he found them without supplies or ships. On 29 August Ribault arrived with seven ships and 300 men, and superseded Laudonnière, who was ordered home to defend himself against charges of treason and tyranny. In Ribault's absence the Spaniards attacked Fort Carolina and massacred the colonists. Laudonnière escaped, took refuge in England, and did not return to France till 1566.

Laughing Gas, a name given to nitrous oxide after its remarkable physiological effects were discovered by Sir Humphry Davy in his 'Researches,' published in 1800. The effects are generally of a pleasurable kind, and the person under the influence of the gas is more or less excited, dancing, singing, laughing, or indulging in other violent motions. This by prolonged inhalation ceases, and stupor and anesthesia, or insensibility to pain, supervene. Hence the use of this gas in dental and surgical operations. See ANÆSTHETICS.

Laughing Jackass, the jackass-kingfisher (q.v.).

Laughing Philosopher, a characterization of Democritus of Miletus (q.v.). He laughed at the follies of man, and is distinguished by this epithet from the "weeping philosopher," Heraclitus, who mourned for human depravity and infatuation.

Laughlin, läf'lin, James Laurence, American political economist and educator: b. Deer-

field, Ohio, 2 April 1850. He was graduated from Harvard in 1873. In 1878 was appointed instructor of political economy there and was assistant professor 1883-7. From 1887 to 1890 he was president of the Manufacturers' Mutual Insurance Company of Philadelphia; in 1890-2 professor of political economy at Cornell; and in 1892 became head professor of the same department in Chicago University. In later years he has given special attention to the study of financial questions; in 1894-5 he prepared a scheme of monetary reform for the San Domingo government which was later adopted; and he has been a member of the monetary commission created by the Indianapolis Monetary Conference in 1897. He is a member of the International Institute of Statistics and of the Political Economy Club, of which he was one of the founders. He has written: 'Anglo-Saxon Legal Procedure in Anglo-Saxon Laws' (1876); 'Study of Political Economy' (1885); 'History of Bimetallism' (1886), a comprehensive treatment of the subject; 'Elements of Political Economy' (1887); 'Gold and Prices since 1873' (1887); 'Facts about Money' (1895); 'Report of Monetary Commission' (1898); 'Principles of Money' (1902); 'Reciprocity' (1903); and has prepared an abridged edition of Mill's 'Principles of Political Economy' (1884), with a short biography and a sketch of the history of political economy. He is editor of the 'Journal of Political Economy' and was one of the founders of the 'Quarterly Journal of Economics' to which he has contributed frequently.

Laughter, a movement of the muscles of the face, correlated with other movements of the entire body, usually indicative of mirth or happiness. The expression of laughter is not always indicative of a psychical appreciation of enjoyment, for it is well-known that idiots are prone to laughter which is often without any such significance. Many idiots constantly show a laughing countenance, the smile being more or less stereotyped; or they may grin, giggle, or chuckle at the slightest stimulus, whether of food, color, music, or personal contact. It is probable that in such cases laughter is purely an expression of physical contentment, rarely associated with higher or more complex ideas.

In children, laughter is more sensible, but the expressions of joy usually contain an element of uncontrolled exuberance. Thus they clap their hands, stamp their feet and jump around in pure excess of vital spirits. In adults the subject of laughter is extremely complex. As a rule, during laughter, the mouth is more or less open, the corners being drawn backward and usually somewhat upward. The upper lip is commonly raised. The drawing-back movement is seen best in the broad smile, or in moderate laughter; in out-and-out mirth the teeth are usually exposed by the raising of the upper lip. The cheeks are ordinarily drawn upward at the same time, and wrinkles are formed under the eyes. This movement in old persons makes a very characteristic feature, and the wrinkles so frequently found in their faces largely assist to interpret the sense of contentment indicated. Associated with laughter, there is often a change in the character of the eye. The bright and sparkling eye described by

LAUGIER — LAUNDRY MACHINERY

Darwin and others who have devoted much time to this subject is the eye of laughter. Often tears suffuse the eyes and destroy this appearance of brightness, but this is usually due to excessive laughter.

Numerous signs are produced during these expressions of joy. During laughter, the movements of the chest and larynx are almost exactly opposite to those that accompany the screams and cries of distress. In these latter the exspirations are prolonged and continuous, and the inspirations short and interrupted; whereas in joy the exspirations are usually short and the inspirations long.

"In all races of men," says Darwin, "the expression of good spirits seems to be the same, and it is easily recognized"; and he adds that "from the natives of New Zealand to the highly civilized Caucasian, much the same forms of emotional expression are to be observed." Laughter is often an indication of general character; it is seldom two persons laugh exactly alike; and the study of laughter becomes a study of muscular movements. The "spontaneous, hearty laughter of sincere feeling is very different from the affected and constrained laughter of insanity." Moreover, there are laughs which betoken peculiar constitutions of mind and character; laughs that are mechanical, nervous spasms, expressing nothing and expressed when there is nothing to laugh at, or perhaps something not to laugh at; laughs which, when they have not been acquired and are unconsciously formed, are signs of neurotic instability, but sure signs of guile when they are affected and consciously used—untrustworthy, anyhow, as laughter. Maudsley describes what he terms a "*quasi-pathological laugh*," which is the abortive and incoherent laugh of the person of insane temperament, which is laughter pulled up abruptly, followed by a sudden facial seriousness, or a change which affects only a part of the features, while the rest are unmoved. Consult: Darwin, '*Expression of the Emotions in Man and Animals*' (1892); Hughes, '*Die Mimik des Menschen*' (1900).

Laugier, Paul Auguste Ernest, French astronomer: b. Paris 1812; d. 1872. He studied at the Polytechnique and at the Paris Observatory under Arago. In 1843 he was elected to the Academy of Sciences, and was afterward attached to the Bureau of Longitudes. He was favorably known for his work on the subjects of solar equator and sun-spots.

Laumontite, lá'món-tít, one of the zeolite family of minerals. It usually occurs in masses made up of white, vitreous to pearly, monoclinic prisms. It is a hydrous silicate of aluminum and calcium, $H_2CaAl_2Si_4O_{10} + 2H_2O$. Upon exposure the normally colorless and transparent crystals quickly lose part of their water of crystallization and become white, opaque, brittle and much below the normal hardness of 3.5 to 4. Laumontite is rarer than most of the zeolites with which it is associated in many localities. Especially fine specimens are found at Nagyag, Transylvania, in Nova Scotia, New Jersey, Lake Superior, etc.

Laun, Friedrich, the pseudonym of the German novelist Friedrich Schulze (q.v.).

Launceston, läns'tōn, England, a borough and market town in the county of Cornwall, 24 miles north by west of Plymouth, and 2 miles west of the Tamar. It is situated on the side of a hill, is generally well built, and has a fine church, built of granite in the 16th century and restored in 1852; several chapels; a guildhall in castellated style; a masonic hall; a town-hall (1887); excellent market-places; a grammar, national and board schools. There are ruins of the old castle, and of a fine priory. Agriculture, tanning, and iron-founding are the chief employments. From 1832 till 1885 Launceston returned a member to Parliament, and before 1832 it was represented by two members. This town was long the capital of Cornwall; but Bodmin is now the assize town. It gives name to one of the six parliament divisions. Pop. (1901) 4,053.

Launceston, Tasmania, city in the county of Cornwall, 133 miles north of Hobart, at the confluence of the North and South Esk rivers, the united stream taking after this the name of the Tamar, which is navigable up to the town from the sea, a distance of 40 miles. The streets are regularly laid out and lighted by electricity. The principal buildings are the town-hall; the Albert Hall; the mechanics' institute, with library; a Church of England grammar-school; Wesleyan Ladies' College; a convent school, and other educational institutions; a new post-office; a custom-house; a museum and art gallery; the Academy of Music; military barracks; jail and court-house; hospital, etc. Wheat, oats, peas, and potatoes are the chief crops grown in the neighborhood, but fruit culture is steadily extending. Pop. (1891) 17,208; (1901), with suburbs, 20,358.

Launch, (1) in ship-building, a term comprehending the apparatus for launching a ship. (2) The largest boat belonging to a ship of war. It is only used for service which cannot be performed by the smaller boats, being hoisted on board and kept on deck just abaft the foremast, where it serves as a receptacle for lumber and stores. In large men-of-war the launch is sometimes decked over, and is capable of mounting several light guns. The corresponding boat of merchant vessels is called the long boat. The launch is from 30 to 40 feet long, having a beam from .29 to .25 of its length. It has 10 or 12 oars, and is carvel-built.

Launder, in mining, a wood water-gutter or pipe. A trough for conveying water to a stamp-mill or other hydraulic apparatus for comminuting or sorting ore. Also a trough or box to receive the slimes from the stamps.

Laundry Machinery. Laundry machinery as it is understood from the commercial standpoint, includes a class of mechanical devices developed during a comparatively recent period, to supplant the primitive processes of laundering that have existed during all time. While the use of laundry machinery in crude forms dates back for a considerable period, the past three or four decades mark the era of the development and manufacture of power machinery for laundering purposes, in a sufficient degree to warrant recognition as an independent branch of industry. This is due to the fact that the steam laundry is a modern institution; and the development and extent of manufacture of laundry machinery has gone hand in hand with

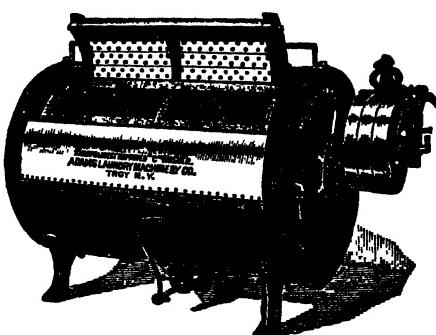
LAUNDRY MACHINERY

the growth of the laundry interest. The steam laundry of to-day performs on a large scale, and by improved mechanical devices, the processes of cleansing, that for centuries had been confined to hand work in connection with the running stream, or the wash tub of later years. The growth of the laundry as an organized business has been so rapid during the past quarter of a century, that its changing needs have made, and still keep, the invention and production of laundry machinery in a state of constant development of new ideas and forms. So that while the laundry machinery business has passed the embryotic stage, it may fairly be said in the opening years of the 20th century to be in an era of great advance, holding and to hold a much more important position as an independent and recognized branch of mechanical industry. The city of Troy, N. Y. (the birthplace of the collar, cuff and shirt industry, as set forth in an article under that head) was practically the home, and for many years was the centre, of the steam laundry interests of the country; an interest which has now extended to every city or place of any importance in the land. So general is the recognition of this fact, that the name "Troy Laundry" is still retained by hundreds of laundries in various parts of the United States, and is even seen abroad. It was natural, therefore, that the earliest organized movement to produce the machines demanded for laundering purposes should have been made in Troy. That city has always been and still remains a strong factor in the laundry machinery industry, which, however, with its diversified and growing interests is now located and strongly entrenched in various sections. All the manufacturers of laundry machinery are, however, located east of the Mississippi River.

The introduction, use and development of laundry machinery has been much more rapid and general in the United States than in Europe. American manufacturers are competing actively for the trade of all foreign markets. The greatest limitation to the development of the trade abroad is the conservatism of foreign nations in adopting the more advanced methods of laundering calling for the modern types of American machinery. While there are very many forms of laundry machinery in use, the most prominent examples of the art are included in those that perform the three most important functions of laundering, namely washing, drying and ironing.

Washing Machines.—The first process, washing, is performed by two types of machines, the dash wheel and the reverse wheel. The dash wheel consists of a large cylinder divided into pockets by partitions and revolving in one direction inside of an outer case. This machine is used principally in new work laundries. The more generally used washer is the reverse wheel. In this the goods are placed in an inside cylinder having perforations to admit the free passage of water, steam and soap among the goods. This cylinder runs in an outside shell or case, the water and steam being let in by pipes, and by automatic reversing devices the inside cylinder revolves several times in one direction, then an equal number in the opposite one. This action loosens up the goods and subjects them freely to the action of water and soap, and so removes the dirt from the garments. The inside cylinders are made of wood or brass and the outside cases of wood, galvanized iron or brass.

Drying Machinery.—The next process is that of drying. The goods are first taken from the washer and placed in what is known as a wringer or centrifugal extractor. This machine consists of a perforated copper basket, revolv-



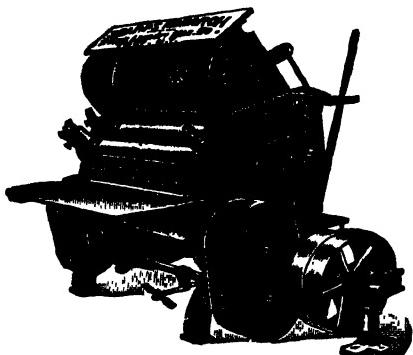
Reverse Washer.

ing rapidly inside an iron or steel curl or case, and making from eight to fourteen hundred revolutions per minute. The water is thrown out through the perforations in the basket by centrifugal force, and in about twenty minutes the goods are ready to be taken out partially dried. The drying process is completed by the use of a dry-room. The improved types include the cabinet room, made up of a series of racks or trucks arranged with bars or hooks to hold the collars, cuffs, shirts or other garments, and running on tracks into a cabinet made of wood or metal. The heat is supplied by a series of steam coils arranged horizontally or longitudinally in the room. Fans are used to circulate the heat among the goods and accelerate the rapidity of the drying process. The most recent development of the drying art is the automatic dry room. In this the goods are hung on hooks attached to an endless chain or wire cable, which enters into and occupies the room in a series of loops, and passes out at the other end of the room. The goods are dried in one time of passage, and are removed from the hooks by an automatic device so that they fall dry, into baskets on the outside of the room.

Ironing Machinery.—The third general division of laundry work is the ironing, for which many forms and styles of machines are used. For collars and cuffs, it is done on machines consisting of a combination of revolving covered drums coming in contact with revolving heated rolls, the goods being ironed as they pass through. The covered drum is wound with layers of felt, cotton flannel and muslin, forming a padding much the nature of that which covered the old-fashioned family ironing board. The heated rolls are highly polished and are heated by gas or steam. Formerly all these machines required the goods to be passed through several times for a perfect finish. The more modern types of ironers are known as "one pass machines." These have a series of heated rolls and drums so that the collar is put in at the front of the machine and comes out at the back perfectly ironed. Some of these ironing machines of modern production have a capacity of from 250

LAUNITZ — LAUREL

to 300 dozen collars or cuffs per hour. The length of the ironing surface of the heated rolls of collar and cuff ironing machines of different sizes varies from 12 to 48 inches. For the ironing of flat pieces such as sheets, table linen and towels, a machine known as the mangle is used, by which the goods are dried on revolving cylinders heated by steam. In the recent types of mangles great capacity is attained; in some the length of ironing surface reaches ten feet and requires several operators to feed the machine. For shirts, a separate class of ironers is required. These are the bosom, body, sleeve



Collar and Cuff Ironer.

and band ironers. The general principle and operation are, however, the same as in the collar and cuff ironers, previously described. The most recent development of shirt ironing machinery is a series of machines steam heated, and on which the finish is produced by pressing instead of ironing.

Other important machines not described above and which are used in laundering are starchers, shapers and dampeners. There are many other forms of laundry machinery made to cover parts of processes, and new forms and types are constantly being invented and put on the market.

JOHN T. BIRGE,
*Vice-President and Treasurer, Adams Laundry
Machinery Company.*

Launitz, Robert Eberhard, Russian-American sculptor: b. Riga, Russia, 1806; d. New York 1870. He studied under Thorwaldsen in Rome; emigrated to America in 1828, and in 1833 became a member of the National Academy. Among his works are the Pulaski monument at Savannah, Ga., and the battle monument at Frankfort, Ky.

Laupen, low-pēn, town in Canton of Bern, Switzerland, situated at the junction of the Sense and Saane, 10 miles southwest of Bern. It was the scene of a victory of Bern over Fribourg and allies in 1339.

Laura, the French lady celebrated by Petrarch as the object of his life-long passion: b. Beaumont, Provence, 1308; d. Avignon 6 April 1348. Petrarch has told us that he saw her for the first time in the Church of Santa Chiara at Avignon, on Good Friday 6 April 1327; that she was the mother of several children and died on Good Friday at the hour in which he had first seen her, and was the same evening laid to rest in the Franciscan Church. It would appear

that Laura was the daughter of Audibert de Noyes and was married to Hugo de Sade and bore him 11 children. There is no ground for supposing that Laura was a mere creature of the poet's fancy. But consult: Minich, 'Sulla Persona della Celebre Laura,' in 'Atti dell' Instituto Veneto' (Vol. IV., series 5, 1877-8); D'Ovidio, 'Madonna Laura' (in the 'Nuova Antologia' 15 July, and 1 Aug. 1888).

Laura, a small monastic community, such as was common in Egypt, Palestine and Syria. It formed a mean between the solitude of the hermitage, and the community life of the mediæval monastery. There was a superior, but no very definite rules. The cells were separately clustered like an encampment round the chapel. The brethren only met together twice a week, and subsisted on bread and water. Three monks occupied one cell, under Pachomius. A famous laura was founded by Chariton, a hermit, at Pharan near Jerusalem, and others in the 5th century by Sabas, a celebrated hermit. The Empress Eudocia, wife of Theodosius II, also instituted a laura. The derivation of the term laura is uncertain.

Laura'ceæ. See LAUREL.

Lauraguais, lō-ra-gü-ā', an ancient division of Languedoc, France, situated near Castelnary. It now forms parts of the departments of Aude, Tarne, and Haute-Garonne.

Lau'reate, Poet. See POET LAUREATE.

Laurel, lá'rēl, Miss., town in Jones County, on the Gulf & S. I., and the New Orleans & N. W. R.R.'s. In 1890 this was a village of 100 people, while in 1903 it had 7,000 population. The town owes its beginning to the sawmills of Eastman, Gardiner & Company, and of the Kingston Lumber Company. These sawmills have timber sufficient to last them at least 25 years. Laurel has the following important industries in addition to its sawmills: Laurel Cotton Mill, having 10,000 spindles and 640 looms, and employing 400 hands; Laurel Oil & Fertilizer Company—using 40 tons of cotton-seed daily; Lindsey Wagon Company; Brick & Tile Company, having a capacity of 30,000 bricks per day, and Mississippi Knitting Mills, with a capacity of 125 pairs of hose per day. It also has many smaller factories, as a machine shop, foundry, cotton compress, ice factory and electric light and power plant. The town has two national banks.

Laurel, a tree or shrub of the order Lauraceæ, having alternate, simple, often evergreen, exstipulate leaves; panicles or umbels of perfect flowers and one-seeded drupes or berries. The species, of which there are about 1,000, mostly tropical, are divided into about 40 genera and are most largely represented in Brazil and southwestern Asia. Among the best-known American members are the red bay (*Perssea carolinensis*), sassafras (*Sassafras officinale*), pond spice (*Litsea geniculata*) and wild allspice (*Lindera benzoin*), all of which are found east of the Mississippi. The tropical species are, however, more important. Among them are avocado or alligator pear (*Persea gratissima*), cinnamon, camphor-tree and cassia (*Cinnamomum*), and greenheart (*Nectandra rodiae*). The name is usually restricted, however, to trees

LAUREL-MAGNOLIA — LAURENT

of the type-genus *Laurus*, the few species of which are natives of southwestern Asia, but have become naturalized in the Mediterranean region, and are characterized by dark, evergreen leaves, small, dioecious or perfect, inconspicuous flowers in little axillary umbels, and small, succulent, purple, cherry-like berries. They sometimes attain heights exceeding 50 feet, but are usually scarcely more than a third of this height. The most popular species is the poet's or wreath laurel (*L. nobilis*), called in America sweet-bay. See BAY.

Among the numerous other shrubs known as laurels are the mountain-laurel (q.v.) and other species of *Kalmia*, the Portugal laurel (*Prunus lusitanica*), the cherry-laurel (*Prunus laurocerasus* and *P. caroliniana*), and the ground-laurel (*Epigaea repens*), better known as "trailing arbutus."

Laurel-magnolia, the sweet-bay. See BAY.

Laurence, là'rëns, **Saint**, Roman Christian martyr: b. Rome 10 Aug. 258. He was of Spanish race, and when, in the Valerian persecution Pope Sixtus II. was carried to martyrdom, Laurence as deacon and treasurer of the Church refused to give up the keys of the treasury, and according to tradition was put to death by being laid over a fire on bars of iron. The Escorial was built by Philip II. in fulfilment of a vow made on St. Laurence's day, 10 August, to the honor of that saint, the ground plan being after the pattern of a gridiron.

Laurence, Samuel, English painter: b. Guilford, Surrey, 1812; d. London 28 Feb. 1884. He was one of the most successful portrait painters of his day, and had as sitters many of his most eminent contemporaries; including Whewell, Browning, Carlyle, Dickens, Froude, F. D. Maurice, Thackeray, Tennyson and Lowell.

Laurens, là'rëns, **Henry**, American patriot and statesman: b. Charleston, S. C., 1724; d. there 8 Dec. 1792. He was a mercantile clerk in London and Charleston, and in the latter place established a successful business. An opponent of royal aggression, he was involved in numerous disputes with the crown judges regarding their decisions in marine law and the admiralty courts. Having withdrawn from active business, in 1771 he went to England, and was there one of the 38 Americans who in 1774 signed a petition to advise Parliament against passing the Boston port-bill. In 1775 he became a member of the first South Carolina provincial congress, in 1776 vice-president of the council of safety in that colony, and from 1 Nov. 1777, to 10 Dec. 1778, was president of the Continental Congress in succession to Hancock. He sailed in 1779 as minister to Holland for the negotiation of a treaty with that country, but his packet, the Mercury, was captured by the British, he was examined by the privy council, and from 6 Oct. 1780 was imprisoned for about 15 months in the Tower on suspicion of high treason. Having been exchanged for Cornwallis, he was sent to Paris, where with Adams, Franklin, and Jay, he signed the preliminary treaty of peace with Great Britain 30 Nov. 1782. His "Correspondence," edited by Moore, was published in 1861.

Laurens, Jean Paul, zhôñ pôl lô-rôñ, French artist: b. Fourquevaux, department of Haute-Garonne, in 1838. He studied in the

Ecole des Beaux-Arts at Toulouse, and became a pupil of Cogniet and Bida in Paris. His work is distinguished for boldness and vigor, and the tragic elements of his subjects are heightened by the dramatic realism of the artist. In point of moderation in treatment, and of taste in coloring, his compositions have received some adverse criticism, but his powerful effects are not called in question. In 1891 he was elected a member of the Académie des Beaux-Arts and president of the Société des Artistes Français. Among his pieces are: "Death of Tiberius" (1864); "A Voice in the Desert" (1868); "Execution of the Duc d'Enghien" (1872); "The Pool of Bethesda" (1873); "The Interdict" (1875); "The Austrian General Staff around the Deathbed of General Marceau" (1877); and "Napoleon and Pius VII. at Fontainebleau" (1894).

Laurens, John, American soldier: b. South Carolina 1753; d. there 27 Aug. 1782. He was the son of Henry Laurens (q.v.). He was educated in England, and in 1777 became an aide to Washington, whose secretary he also frequently was. From the battle of Brandywine (11 Sept. 1777), he participated, it is said, in all actions in which Washington commanded. He was severely wounded at Germantown, commanded the light infantry when the United American and French troops under Lincoln and D'Estaing attempted the capture of Savannah, and aided in the defense of Charleston when besieged by Clinton. In the spring of 1781 he was sent to France to obtain money and supplies. Contrary to diplomatic precedent, he requested and obtained an audience with the king, and secured the necessary assistance. He captured one of the two redoubts at Yorktown, and received Cornwallis' sword. He was killed in a skirmish on the Combahee River, S. C. What Washington called his "intrepidity bordering on rashness" won for him the sobriquet of "the Bayard of the Revolution." His correspondence, with a memoir by William Gilmore Simms, was privately printed in 1867.

Laurens, Joseph Augustin Jules, zhô-zëf ô-güs-täñ zhul lô-rôñ, French painter: b. Carpentras 1825. After studying painting under Delaroche he traveled in Persia, Turkey, and Asia Minor. As a landscape painter he obtained wide recognition and was also highly successful in his lithographic copies of Diaz, Bonheur, Corot, Tryon, etc. His pictures in color include: "Vue de la Grande Chartreuse" (1840); "Les Environs de Vaucluse" (1845); "Forêt de Fontainebleau"; "L'Hiver en Perse" (1867); and "Le Rocher de Vannes" (1867); which last is in the Luxembourg. He has published with original illustrations "Voyage en Turquie et en Perse" (1856).

Laurent, Auguste, ô-güst lô-rôñ, French chemist: b. La Folie, Haute-Saône, 14 Nov. 1807; d. Paris 15 April 1863. In 1838 he became professor to the Academy of Sciences of Bordeaux, which post he held for eight years. In 1848 he was made assayer to the mint and chemical adviser of the minister of war. His researches were very numerous, embracing all departments of the science, organic and inorganic, and opening up new fields and new views. He was one of the champions of the unitary system against the dualistic held by most of the chemists of the time. He was opposed also to

LAURENTIAN MOUNTAINS—LAURIUM

the electro-chemical theory, which his investigations into the derivatives of naphthaline did so much to shake, and maintained the doctrine of types—forms of constitution of bodies which admitted of parts being substituted by other elemental or compound substances without the type of the original body being altered. His views on general chemical theory appeared in a posthumous work entitled ‘Méthode de Chimie,’ translated into English by Odling, and published by the Cavendish Society 1855. Many of the doctrines there advocated as novelties are now universally accepted, and have become a fundamental part of modern chemical theory, classification, and instruction.

Laurentian (lā-rēn'shī-an) Mountains, a range in British North America, extending for over 3,000 miles from Labrador to the Arctic Ocean, forming the watershed between Hudson Bay, the Saint Lawrence, and the Great Lakes, and dividing the same bay from the sources of the Mackenzie River. The average elevation of this range is about 1,500 feet, while some of the peaks attain a height of 4,000 feet. The rock formation belongs to the sedimentary deposits known as the Laurentian system.

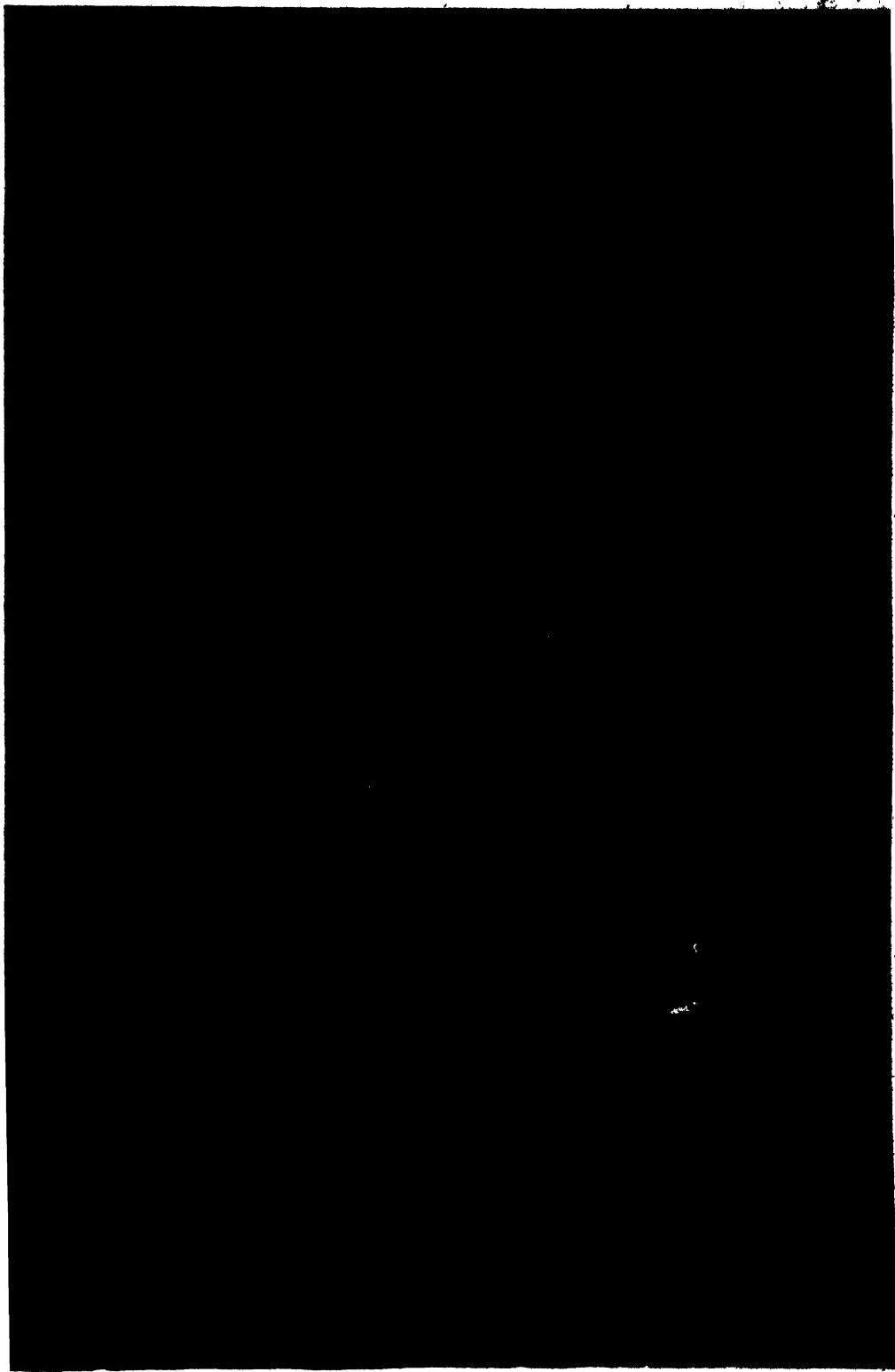
Laurentian System. The term Laurentian has been applied by certain Canadian geologists to a great series of rocks, partly of sedimentary and partly of igneous origin, that is typically developed on the Laurentian Hills north of the St. Lawrence River. Similar rocks occur elsewhere along the Height of Land, from Labrador to the western end of Lake Superior. The rocks are of very ancient date but the exact significance of the term Laurentian as a time division or as a lithologic name is in dispute. The typical Laurentian includes a series of gneisses, mica schists, quartzites and crystalline limestones with intrusive granites and greenstones. The total thickness may be 30,000 feet. Whether or not any of these rocks contain fossils is uncertain, though Dawson found certain peculiar markings in limestone which he believed were of organic origin. He named this supposed fossil *Eozoon canadense*. The term Laurentian is little used by American geologists, and the so-called Laurentian system is included in the Algonkian or with the upper and lower Huronian. In fact, about all that can be said of the age of the Laurentian rocks as a whole is that they are certainly pre-Cambrian.

Lauric Acid, or Dodecoic Acid, a fatty acid occurring (as glyceryl ether) in the berries of the bay-tree (*Laurus nobilis*), in pichurim beans, in cocoanut oil, and elsewhere. It may be prepared from the oils in which it occurs by saponification, followed by the fractional precipitation of the acids by means of barium acetate. Lauric acid has the formula $C_{12}H_{24}O_2$, and is insoluble in water, but very soluble in both alcohol and ether. From its solution in alcohol it crystallizes in the form of silky needles, melting at 110° F. With the metals it forms a series of salts called laurates, which, with the exception of barium laurate and the laurates of the alkali metals, are mostly insoluble in water. The glyceryl ether (also known as trilaurin, or laurostearin), has the formula $C_8H_{16}(C_{12}H_{24}O_2)_2$, melts at 113° F., and may be obtained from bay-berries by extraction with alcohol.

Laurie, low'rī, Simon Somerville, Scottish educator: b. Edinburgh 13 Nov. 1829. He was educated at the University of Edinburgh; for five years was a teacher on the Continent; and returning to Scotland held important positions in connection with education. In 1876 he was appointed to the professorship of the institutes and history of education in the University of Edinburgh. He has published many works, among which are: ‘Philosophy of Ethics’ (1866); ‘Primary Instruction in Relation to Education’ (1867, 6th ed. 1898); ‘Notes on British Theories of Morals’ (1868); ‘Life and Educational Writings of Johann Amos Comenius’ (1881, 6th ed. 1898); ‘Metaphysica Nova et Vetusta by Scotus Novanticus’ (2d ed. 1885); ‘Medieval Education and Rise and Constitution of Universities’ (1886); ‘Language and Linguistic Method in the School’ (1890, 3d ed. 1899); and ‘Historical Survey of Pre-Christian Education’ (1895, 2d ed. 1900).

Laurier, lō'rī-ā, Sir Wilfrid, Canadian political leader: b. St. Lin, L'Assomption County, Quebec, 20 Nov. 1841. He studied at L'Assomption College and law at McGill University (Montreal); in 1865 and 1866 was a vice-president of the Institut Canadien (Montreal), which formed the nucleus of a movement toward intellectual liberalism on the part of the younger French and was strongly opposed by the clergy; and in 1866 opened a law office at Arthabaskaville. In 1871 he was elected to the Quebec legislature, where he was an effective but infrequent speaker, and in 1874 was chosen at the general election to the Ottawa House of Commons for the Drummond and Arthabaska district; but his influence as a debater in the Canadian parliament was hampered by his ignorance of English. He was, however, quickly recognized as the leader of the Liberals in Quebec province, and in 1877 was selected for the portfolio of inland revenue in the Mackenzie administration. In 1878 he retired upon the return to power of Sir John Macdonald and the Conservatives. On 7 June 1887, he succeeded Blake as chief of the Liberal Opposition, though he himself advised the choice of an English-speaking Protestant; and in 1896 he became the first French-Canadian premier of the Dominion. In that post he has observed a policy of discrimination in favor of British products and of protection against the United States for at least so long as Canadian products are denied American markets. He has rendered great service through his strong opposition to antagonisms of creed and race. Consult his ‘Speeches,’ edited by Barthe (1890); and Willison, ‘Sir Wilfrid Laurier and the Liberal Party’ (1903).

Laurium, lā'rī ūm, Mich., village in Houghton County; on the Copper R. and Mineral R. R.R.'s. It adjoins Calumet, and is 7 miles from Lake Superior and 12 miles north by east from Houghton. It is situated in the Keweenaw Peninsula, in the northern part of the State, in one of the richest copper regions of the United States. There are but few manufacturing establishments; mattress factory, clothing shops, and cigar factories. There is considerable local trade. Copper mining is the chief occupation; some of the largest mines of the peninsula are in the vicinity. Pop. (1890) 1,159; (1900) 5,643; (1903) 9,000.



SIR WILFRID LAURIER.

LAURIUM — LA VALLIÈRE

Laurium, a mountain, 1,171 feet in height, near Attica, Greece. It was famous in ancient times for its silver mines. Since 1874 great heaps of slag have been profitably worked, and fresh deposits of argentiferous lead and of zinc ore have also been found so that the most important mining in the kingdom is carried on here.

Laurocerasin, a name proposed by Lehmann for the glucoside amygdalin (q.v.), when prepared from laurel leaves (*Cerasus laurocerasus*), or from alder bark (*Rhamnus frangula*).

Lausanne, lō-zān', city, and capital of the Swiss canton of Vaud, on the slope of the Jura Mountains, close to the shore of the Lake of Geneva, on which the village of Ouchy (where Byron wrote 'The Prisoner of Chillon') forms its harbor. Here Gibbon resided for many years, and the house in which he wrote the greater part of the 'Decline and Fall' is still shown. John Kemble was buried here. It has the University, founded in 1536, and a cantonal library of 125,000 volumes. There are large manufactories here of machinery, tobacco and chocolate. Pop. (1901) 47,039.

Laut, Agnes C., Canadian author: b. Ontario 11 Feb. 1872. In childhood she was taken to Winnipeg. She entered Manitoba University and studied there into the junior year, during which she withdrew on account of ill health, afterward spending her summers in the Rocky and Selkirk mountains. In 1895-7 she was an editorial writer for the Manitoba *Free Press*, Winnipeg; subsequently became correspondent of Canadian and English papers and of newspapers and magazines in the United States. She has written: 'Lords of the North' (1900); 'Heralds of Empire' (1902); and 'The Story of the Trapper' (1902).

Lauterbrunnen, low-tér-broon-ěn, the name of an Alpine valley and also a village in the Swiss canton of Bern, through which flows the Weisse Lütschine. The valley is surrounded by perpendicular walls of sandstone from 1,000 to 1,600 feet in height, down which pour about a score of waterfalls. Of these the finest is the *Staubbach* ("dust-stream"), 866 feet in height. The pop. of the village in 1900 was 2,547.

Lauzon, Jean de, zhōn dē lō-zōn, French colonial administrator: b. 1582; d. 1666. He was a member of the Hundred Associates, who organized to promote the settlement of New France. He seems to have directed most of his energies toward acquiring landed property in Canada for himself and his family, and gained for his son the sole right of fishing on 60 leagues of the St. Lawrence, with a title to the adjacent lands. His own title to the island of Montreal he sold to the Jesuits. He was for five years governor of New France (1651-5), but his policy was feeble and short-sighted. He returned to France before his second term was over.

Lauzun, Antonin Nompar de Caumont, än-tō-nän nōn-pär dē kō-mōn lō-zün, Duc de, a French courtier: b. Gascony 1633; d. 19 Nov. 1723. A poor nobleman from Gascony, he made his fortune at the French court by his elegant manners and wit and dauntless ambition, and became a favorite of many of the most emi-

nent and beautiful women, and of Louis XIV., who appointed him to various offices. In 1688 he escorted the queen of James II. and her infant son to France, and in 1689 took an active part in the fruitless expedition to Ireland. He was raised to the rank of duke in 1692. Lauzun figures frequently in the French literature of the 17th century, and even of a later period, particularly in the works of Mme. de Sévigné, La Bruyère, and St. Simon.

La'va, a name given to those products of volcanic eruptions sent forth in fiery streams from the interior of the earth, and which, though they become stationary on cooling, are, in consequence of the gases which accompany them, more or less inflated, and seldom form very dense rocks. The constituents of lava are entirely similar to those of basalt, greenstone, porphyry, etc., which were no doubt formed in a similar manner, and are in this respect completely identified with them.

Laval-Montmorency, François Xavier de, frān-swā ksav-ē-ä de lā-val-mōn-mō-rōn-sē, French Roman Catholic prelate: b. Laval, France, 30 April 1623; d. Quebec 6 May 1708. He became a priest in 1645, and in 1651 was appointed missionary bishop of Cochin-China, a post which he declined to become archdeacon of Evreux. In 1659 he came to Canada as apostolic vicar, with the dignity of bishop of Petra *in partibus*. There he established (1663) the Quebec Seminary. In 1674-83 he was titular bishop of Quebec. He was an active and influential figure in governmental affairs. Laval University at Quebec is named in his honor.

Laval (lä-väl') University, a French Catholic institution at Quebec, Canada, established in 1852. It is under direct control of the Roman Catholic authorities of Rome, and by virtue of its royal charter the visitor of the university is always the archbishop of Quebec. There are four faculties, theology, law, medicine and arts. In 1902 there were 384 students, 51 professors, and 140,000 volumes in the library.

La Vallière, Louise Françoise de la Baume le Blanc de, loo-ēz frān-swaz dē lä bōm lē blān dē lä vā-lē-är, French mistress of Louis XIV.: b. Tours 7 Aug. 1644; d. Paris 6 June 1710. She was descended from an ancient and noble family, and in 1661 was brought to court by her mother, where Louis presently noticed her. Her manners were amiable and winning, and her sweet and tender disposition rendered her attractive. What is still more extraordinary, notwithstanding her equivocal position, she possessed extreme, indeed morbid, delicacy and modesty. She bore Louis four children, but was always painfully sensible of the disgrace of their birth. Two of them died in infancy. When superseded by Madame de Montespan she retired into the Carmelite convent in the suburb of St. Jacques, where she took the veil in 1675. She is considered the author of 'Réflexions sur la Miséricorde de Dieu' (1680), a copy of which, dated 1688, with corrections by Bossuet, was discovered in the Louvre in 1852. A collection of her letters was published in 1767. Madame de Genlis wrote a historical romance founded on the events of her life, and Lebrun executed a penitent Magdalene, of which the face is from her portrait.

LAVATER — LAVERDIÈRE

Lavater, Johann Kaspar, yo'hän kä'spär lä'vä-tér, Swiss physiognomist: b. Zürich 15 Nov. 1741; d. 2 Jan. 1801. As a youth he was not distinguished for studious methods, but early manifested a fervent piety and remarkable powers of persuasion in public discourse. He developed a distinct poetic gift, and was first known through his verses in 1767. Two years later he took orders, became pastor of a Zurich church in 1764, and served in that calling with different churches in his native city until his death. He also enjoyed a contemporary popularity through his mystical writings, now almost forgotten. He is best remembered as the originator of a system of physiognomy, which, although of little practical account to-day, is often referred to by students and writers. The book in which he set forth his system is entitled 'Physiognomische Fragmente zur Beförderung der Menschenkenntniss und Menschenliebe' ('Physiognomical Fragments for the Promotion of a Knowledge of Man and of Love of Man,' 1775-8). It was ornately published, with a profusion of striking illustrations, including portraits of distinguished persons, features to which its fame is considered to have been largely due. Yet Lavater's observations display a penetration and insight into human nature and its varying traits which entitle him to some consideration as scientist and philosopher, and there is a residue of his teachings which the inquiring world still appreciates. He enjoyed an intimate acquaintance with Goethe, who contributed to the 'Fragments' a chapter on the skulls of animals, and strikingly portrayed Lavater in 'Wahrheit und Dichtung.' Goethe afterward became estranged from him, accusing him, not without some grounds, of hypocrisy and superstition, but probably in fact repelled by Lavater's intellectual bigotry. Still Lavater was a man of large and open heart, personally and socially as hospitable as he was mentally intolerant, and with characteristics of true saintliness. During the French occupation of Switzerland he gave proof of his patriotism, and his death resulted from a wound inflicted by a French soldier at the capture of Zürich in 1799. There are several English translations of the 'Fragments.' Consult: Lives by Gessner (1802), Heisch (English, 1842), Muncker (1883); and monographs by Steck (1884) and Von der Hellen (1888). See PHYSIOGNOMY.

Lavedan, Henri, öñ-ré lä-vé-dán, French journalist, critic, novelist, and playwright: b. Orleans 1860. He contributed under the pseudonym of "Manchecourt" a series of brilliant articles to 'Vie Parisienne,' 'Gil Blas,' etc., and in fiction has published: 'Mam'zelle Virtue' (1885); 'Queen Janvier' (1886); 'Lydie' (1887); 'Inconsolable' (1888); 'High Life' (1891); 'A New Game' (1892). Among his plays the most notable are: 'A Family' (1890), awarded a prize of 4,000 francs by the French Academy; and 'Prince d'Aurec' (acted in 1892).

Laveleye, Emile Louis Victor de, ä-mél loo-é vék-tôr dë läv-lâ, Belgian political economist: b. Bruges 5 April 1822; d. Doyon, near Liège, 3 Jan. 1892. He was educated at the Collège Stanislas, Paris, and at the University of Ghent, where he studied law, and in 1864 became professor of political economy in the University of Liège. Among his numerous writings are: 'History of the Provençal Language and

Literature' (1846); 'The Question of Gold' (1860); 'Property and its Primitive Forms' (1874), his best known work; 'The Religious Conflict in Europe' (1875); 'Contemporary Socialism' (1881); 'Elements of Political Economy' (1882); 'Money and International Bimetallism' (1891); 'Government in Democracies' (1891).

Lavender, a genus (*Lavandula*) of perennial herbs, sub-shrubs and shrubs of the order *Labiate*, consisting of about 20 species, native to the Mediterranean region and southwestern Asia. The best known are true lavender (*L. vera*) and spike lavender (*L. spica*), which like other members of the genus have narrow leaves crowded near the ground, and blue or violet two-lipped flowers in whorls which form more or less interrupted spikes. All the lavenders contain similar volatile oils (oil of lavender, oil of spike, etc.), for which the plants are cultivated, and which are obtained from the flowers by distillation with water. The principal use of these oils is in perfumery, but they have been used in medicine as stimulants, tonics and stomachics. The dried flowers are placed with clothing laid away in bureaus and chests, partly because their aroma repels moths, but chiefly for the sake of the pleasant odor imparted to the garments. The perfume called lavender water is a solution of oil of lavender in spirit, along with attar of roses, bergamot, musk, cloves, rosemary, and other ingredients, which after standing for some time is strained and mixed with a certain proportion of distilled water. Lavender plants do not thrive as well in America as in English gardens, but succeed best in light, dry, friable soil, well exposed to the sun. They are best propagated by means of cuttings of one year's growth; seeds are unreliable, since they are slow to germinate and usually produce plants of inferior quality.

Laveran, Charles Louis Alphonse, shärl loo-é al-fôns la-ve-ran, French physician: b. Paris 1845. He was graduated at the School of Military Medicine of Strasburg in 1867. In 1873 he was made a member of the faculty of Val de Grace, and after traveling in Algeria, was appointed professor of military hygiene and clinical medicine in that institution. In 1894 he was appointed director of the Eleventh corps in the Army Medical Service, and subsequently physician-in-chief of the Lille Hospital, and member of the French Academy of Medicine. He is the greatest living authority on malaria, of which disease he discovered the plasmodium. His most important published works are: 'Traité des Fièvres palustres' (1884); and 'Traité de Hygiène militaire' (1896).

Laverdière, lâ-vär-dé-är, Claude Honoré, Canadian author and teacher: b. Province of Quebec 1826; d. 1873. He was educated for the priesthood, which he entered 1851, and was appointed professor in Quebec Seminary and assistant librarian in Laval University. His claim to recognition rests on the efforts he made to unearth and publish to the world the heroic achievements of early French-Canadian settlers and explorers. His works are of extreme value and interest, and include: 'Jesuit Relations' (1858); 'History of Canada.' He also edited 'Voyages of Champlain,' with notes and a life of that explorer. A collection of French-Canadian songs and hymns was also made and published by him.

LAVIGERIE — LAW

Lavigerie, Charles Martial Allemand, sharl mär-sé-äl äl-män la-vézh-ré, French missionary: b. Bayonne 31 Oct. 1825; d. Algiers 26 Nov. 1892. After passing through the Seminary of Saint Sulpice at Paris he was appointed professor of ecclesiastical history to the Sorbonne in 1853. In 1863 he was made bishop of Nancy, and four years later archbishop of Algiers. His life work began by the establishment of his Central-African mission. On being made ecclesiastical administrator at Tunis he began fighting the slave-hunting and slave-barter which desolated the dark continent. For this purpose he agitated in the chief capitals of Europe, and secured pledges from England and Germany to enforce rigidly the anti-slavery article of the Kongo Conference. In 1890 he urged in France the Church's acceptance of the Republic, in which counsel it was considered that he was not without the concurrence of Leo XIII. He was made cardinal in 1882. His published works include 'Œuvres choisies' (1884).

Lavisse, Ernest, ér-nä lä-vës, French historian: b. Nouvion-en-Thiérache, France, 17 Dec. 1842. In 1888 he was appointed to the chair of modern history in the Paris Faculty of Letters and in 1892 was elected to the French Academy. His historical researches have chiefly to do with Germany, and among important works by him are: 'The Mark of Brandenburg under the Ascanian Dynasty' (1875); 'Studies of the History of Prussia' (1879); 'Frederick the Great Before his Accession' (1893); 'The Three Emperors of Germany: William I., Frederick III., William II.' (1888).

Lavoisier, Antoine Laurent, än-twän lô-rän la-vwa-zë-ä, French chemist: b. Paris 26 Aug. 1743; d. there 8 May 1794. He was the son of a wealthy tradesman; was educated at the Collège Mazarin; studied mathematics and astronomy under Lacaille, chemistry in the laboratory of Rouelle, and botany under Jussieu. In 1766 he received a prize offered by the Academy of Sciences (of which in 1768 he became an associate), for an essay on lighting the streets of Paris. Soon after this he traveled through France collecting material from which he constructed the first geological chart produced in that country, during the same period publishing a number of scientific treatises. In 1769 he was appointed farmer-general of the revenue. By means of his wealth and influence he secured special advantages for extending his investigations, which were also stimulated by the new discoveries of Priestley, Cavendish, and Black. In 1776 he was director of the government powder-works; sat on the commission of weights and measures in 1790; and in 1791 became commissary to the treasury. In May 1794 he was accused before the Convention as an ex-farmer-general, condemned by the Revolutionary tribunal, and guillotined. To Lavoisier modern chemistry looks as its chief founder; he organized its methods, reformed the old nomenclature, and virtually established for this science a new terminology. By his work mainly the old phlogistic chemistry was displaced, and he shares with Joseph Priestley (q.v.) the distinction due to the discovery and analysis of oxygen, to which he gave his name, Priestley having already called it "dephlogisticated air." "Lavoisier," says Huxley, "first showed, by the most conclusive experiments, what was really the

composition of atmospheric air" (1777). His chief works, as containing his most important discoveries, are his 'Traité élémentaire de Chimie' (1789); and 'Mémoires de Physique et de Chimie' (1805). Among his others are: 'Sur la Combustion en général' (1777); 'Réflexions sur le Phlogistique' (1777); 'Considérations sur la Nature des Acides' (1778); 'Méthode de Nomenclature chimique' (with Guyton de Morveau, Berthollet, and Fourcroy, 1787). His complete works were published by the French government under the title of 'Œuvres de Lavoisier publiées par les Soins de son Excellence, le Ministre de l'Instruction publique' (1864-93). There are many accounts of his life and work. Consult: Grimaux, 'Lavoisier d'après sa correspondance, ses Manuscrits, ses Papiers de Famille et d'autres Documents inédits' (1888); and Schultze, 'Lavoisier, der Begründer der Chemie' (1894).

Law, John, of Lauriston, Scottish speculator: b. Edinburgh 21 April 1671; d. Venice 21 March 1729. For the purpose of remedying the deficiency of a circulating medium, he proposed to the Scottish Parliament the establishment of a bank with paper issues to the amount of the value of all the lands in the kingdom; but this scheme was rejected. In consequence of a duel he fled from his country and visited Venice and Genoa, from which cities he was banished as a designing adventurer. He accumulated a large fortune by gambling, and at length secured the patronage of the Duke of Orleans, regent of France, and in company with his brother William established his bank in 1716 by royal authority. It was at first composed of 1,200 shares of 3,000 livres each, which soon bore a premium. This bank became the office for all public receipts, and there was annexed to it a Mississippi company, which had grants of land in Louisiana, and was expected to realize immense sums by planting and commerce. In 1718 it was declared a royal bank, and shares rose to twenty times their original value. A vast quantity of paper money was issued, the credit of which was unquestioned, whilst the national bonds remained at a price far below their nominal value. In 1720 Law was made a councillor of state and comptroller-general of the finances; but the shares sank in value as rapidly as they had risen. He was obliged to resign his post, after five months, and for personal safety to quit the kingdom. He lived afterward in great obscurity, finally settling at Venice, and died still occupied in vast schemes, and fully convinced of the solidity of his system, the failure of which he attributed entirely to enmity and panic. Various opinions have been entertained of the merit of his project, and by some it has been thought to have possessed feasibility, had it been carried more moderately into practice. A volume entitled 'Œuvres de J. Law' was published (1790). Consult Wood, 'Memoirs of the Life of John Law' (1824); Mackay, 'Memoirs of Extraordinary Popular Delusions' (1850); Thiers, 'Histoire de Law' (1858).

Law, John, American lawyer: b. New London, Conn., 1796; d. Indiana 1873. He was graduated at Yale and admitted to the bar in 1817, but soon after emigrated to Indiana, where he settled at Vincennes. He was quickly brought to the front as a lawyer; became successively prosecuting attorney, judge for eight

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terms, and in 1838 receiver of public moneys. In 1855 he was appointed judge of the Court of Land Claims. He afterward served in the 37th and 38th Congresses on committees on library, agriculture, and Revolutionary pensions. He was descended from a long line of lawyers, which included the chief justice of the Connecticut supreme court, Jonathan Law, and was president of the Indiana State Historical Society.

Law, William Arthur, English playwright: b. 22 March 1844. He was educated at the Royal Military College, Sandhurst; served eight years in the army and retired as lieutenant. He acted at the Theatre Royal, Edinburgh, Surrey Theatre, and in the provinces, 1872-4, and in 1881 was engaged at the Savoy Theatre. Among his dramatic productions may be mentioned: 'A Night Surprise' (1877); 'Enchantment' (1878); 'Castle Botherem' (1880); 'All at Sea' (1881); 'Nobody's Fault' (1882); 'A Mint of Money' (1884); 'Gladys' (1886); 'Culprits' (1890); 'The New Boy' (1894); 'The Sea-Flower' (1898); 'New-Year's Morning' (1900); and 'A Country Mouse' (1902).

Law (Lat. *lex*, from *lego*, to collect), is in its general sense, a rule of action; in a more restricted signification, a rule of human conduct, or collectively a body of regulations adapted to a particular subject. The term may be variously defined, according to its application. The laws of nature, as expounded by men of science, are general propositions as to the order in which physical events have occurred, and will probably recur; the moral law, or the law of God, is a body of truth perpetuated into the form of rules for the guidance of human conduct. But when we speak of law we usually mean to indicate the law which is set and enforced by civilized states. Law, in this sense, derives its sanction, or binding force, from the penalties by which men are constrained to obey it or punished for breaking it. In the civil code of Louisiana, law is defined as a "solemn expression of the legislative will." Law, regarded as a body of rules for the direction of the individual in his relations with society, is known under various subdivisions, as civil law, criminal law, common law, martial law, constitutional law, international law, merchant law, and canon law, in matters of ecclesiastical jurisdiction. The earliest source of law is custom; the customary rules of a primitive community formed the basis of a civil law at Rome, as they form the basis of the common law in England and the United States. Customary law is rigid and formal; in a progressive society it is relaxed and improved by the use of legal fictions, by the influence of equity, and by legislation. At Rome, for example, the growing commerce of the city compelled the *prætor* to go beyond the civil law (which was a law for Romans only), and to devise a new law of nations, based on principles of equity, such as all civilized men could understand. When the Romans began to study Greek they identified this law of nations with the law of nature, as expounded by the Stoics (q.v.). The civil law, amended and rationalized by successive *prætors* and emperors, has furnished most of the nations of modern Europe with the greater part of their legal rules and ideas; even England, while refusing to borrow directly from the *Corpus Juris Civilis*

(body of the civil law), has derived no small part of her law from that source. Scotch law has largely drawn its principles and nomenclature from Roman law. It is usual to distinguish public law (constitutional and criminal) from private law (which applies to personal status, family relations, property and contract). Constitutional law is of especial importance in the United States. Canon law is not received, as an entire system, by any modern state; but its rules are followed in defining the powers and functions of ecclesiastical persons. The law of nations, or international law, is also divided into public and private.

Sacred Law.—Prior to the codex or early codes containing laws for the people, there were sacred books and doctrines which contained moral and spiritual rules and regulations for human conduct. The four famous law books of India were 'The Sacred Laws of the Aryas,' 'The Institutes of Vishnu,' 'Manu, the Moses of India,' and 'The Minor Law Books.' In China was 'The Book of Rites,' a work devoted to rules of ceremony and of behavior, together with the 'Four Books' of Confucius (q.v.), of equal canonical authority. There was also the Egyptian 'Book of the Dead,' and the Mohammedan 'Koran' (q.v.).

Laws of Moses.—The great Jewish historian and law-giver, Moses, of the tribe of Levi, is considered the author of the first five books of the Old Testament—Genesis, Exodus, Leviticus, Numbers, and Deuteronomy—or, as they are collectively called, the 'Pentateuch,' or the 'Five Books.' The Decalogue given through Moses, and many of the broader provisions of the Mosaic laws, form the basis of all present moral and legal codes. His institutions breathe a spirit of freedom, purity, intelligence, justice, and humanity, unknown to contemporary nations, and above all, of supreme love, honor and obedience to God. They molded the character of the Hebrews, and transformed them from a nation of shepherds into a people of fixed residence and agricultural habits. (See *Moses*.)

Early Law-Makers.—Among the early books on law was Aristotle's lost work on 'Constitutions,' there being 158 of these, one 'The Constitution of Athens,' being left to us in its entirety. Among creators of early constitutions was Solon (q.v.), the illustrious legislator of Athens and one of the seven sages of Greece. He framed a new code of laws and obtained from the citizens an oath that they would observe them for 10 years. It was Solon who declared

Ill fares the State where License reigns;
But law brings order and concordant peace.

Among the law-givers of the period were Gellius, Cicero, Caesar, Pliny, and Marcus Aurelius (q.v.), whose rules of civil law laid the foundation for Justinian's work. This was called 'The Pandects,' and was a digest of Roman law from the commentaries of the great jurists, made by 17 famous lawyers in 530-3 A.D.

Law in the Middle Ages.—In the 15th century Irnerius, a famous jurist at Bologna, revised the study of Roman law, and in the 16th century appeared the 'De Jure Belli et Pacis' of H. Grotius (q.v.), the distinguished Dutch scholar. This work and others have had no small influence on the laws of the present day. In the 17th century Samuel Puffendorf (q.v.),

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eminent German publicist, produced 'The Elements of Jurisprudence,' and 'The Law of Nature and Nations,' which to an extent superseded the works of Grotius. Early in the 18th century Emmerick Vattel (q.v.), the Swiss publicist, wrote his famous work, 'The Law of Nations, or Principles of Natural Law Applied to the Conduct and Affairs of Nations and Sovereigns.' It was translated into various languages, and partly superseded the productions of Grotius and Puffendorf. Then followed Coke and Blackstone (q.v.), the eminent English lawyers, with their invaluable 'Commentaries'; Kent, Maine, Bryce, and others who are famous as law-makers and interpreters of the early codes.

The Ancient Codes.—In the days of the early Roman emperors began to appear the *Codex* or code; collections of laws and constitutions, the earliest being those of Gregorianus or Gregorius and Hermogenianus. The 'Codex Theodosianus' was executed by a commission of eight persons, appointed by Theodosius the Younger, in 429. The work was published and promulgated as laws in 438, and was declared to be a substitute for all the constitutions made since the time of Constantine.

In 528 the emperor Justinian appointed a commission of 10 persons, one of whom was the celebrated Tribonian, to compile a code, incorporating the previous codes of Gregorianus, Hermogenianus, and Theodosius, and also the Constitutions, Rescripts, and Edicts, subsequently issued. The work was performed in 14 months, and it was then declared that the new code should supersede the older compilations. The code of Justinian is of great importance for church history and law, as many edicts of the Christian emperors concerned religious questions. The Gothic codes or laws of the barbarians were all collected in a single code which bore the title of *Codex Legum Barbarorum*. Of these various systems, the first was that of Alaric, king of the Visigoths, augmented by the legislative labors of his successors. To this code was given the title of the Gothic law, *par excellence*, and it was the best and fullest of all the barbarian codes.

Charles VII. was the first of the kings of France who attempted, by a series of general *ordonnances*, to introduce something like uniformity into the legislation of France; and several of his successors, in particular Louis XI. and Henry III., entertained the idea of establishing a single code for the whole kingdom. A code having this object in view was subsequently prepared by Michel de Marillac, and published in 1629. It consisted of 471 articles, and is spoken of by French jurisconsults in terms of the highest praise. In Spain in the 13th century Alfonso X., the most learned prince of his race, prepared the Spanish code called 'Las Partidas,' and executed the Alfonso Tables.

The Code Napoleon (q.v.) was adopted in France in the 19th century. There were five codes, namely, the 'Code Civil,' published in 1804; the 'Code de Procédure Civile,' published in 1806; the 'Code de Commerce,' published in 1807; the 'Code d'Instruction Criminelle,' published in 1808; and the 'Code Pénal,' published in 1810; the first was called by way of eminence, by a law of 3 Sept. 1807, 'Code Napoléon.'

At the restoration its name was changed back to 'Code Civil,' and during the time of the second empire it was again called 'Code Napoléon.' The first book is entitled 'Of Persons,' and in 11 titles treats, (1) of the enjoyment and privation of civil rights; (2) of civil acts, such as the registry of births, marriages, and deaths; (3) of domicile; (4) of absences; (5) of marriages; (6) of divorce; (7) of the relations of father and son; (8) of adoption and official guardianship; (9) of the paternal power; (10) of minority, guardianship, and emancipation; (11) of majority, of guardianship of persons of age (interdiction) and judicial counsel. The second book is entitled 'Of Property and the Different Modifications of Ownership,' and in four titles treats (1) of the distinction of property into real and personal (*immeubles et meubles*); (2) of ownership; (3) of usufruct, of use and habitation; (4) of servitudes (easements, *des servitudes ou services fonciers*). The third book is entitled 'Of the Different Modes of Acquiring Property,' and in 20 titles treats, (1) of successions; (2) of donations *inter vivos* and testaments; (3) of contracts, or conventional obligations in general; (4) of engagements formed without a convention; (5) of the contract of marriage and the rights of the parties respectively; (6) of sale; (7) of exchange; (8) of the contract of letting to hire; (9) of partnership; (10) of loan; (11) of deposit and sequestration; (12) of contracts connected with chance (*aléatoires*), such as wagers and life-rents; (13) of powers of attorney; (14) of becoming security; (15) of transactions; (16) of bodily duress in civil cases; (17) of furnishing security; (18) of mortgages; (19) of taking and setting off by execution; (20) of prescriptions. Under the first empire the adoption of the 'Code Napoléon' was made obligatory on all the countries subject to the French. After the battle of Leipsic, in 1813, which freed Germany from the power of France, it ceased to be obligatory in the German states, but it continued to influence considerably their legislation. At present this code is recognized in the kingdom of Belgium (with some modifications), in the grand-duchy of Baden, in the kingdom of Italy, and elsewhere in Europe. In the United States it was a model for the code of Louisiana. (See *Code*.)

Legal Acts.—An act in law may be defined, (1) Anything officially done by a court, as the phrases "Acts of Court," "Acts of Sederunt," etc. (2) In bankruptcy, an act the commission of which by a debtor renders him liable to be adjudged a bankrupt. (3) In civil law, a writing which states in a legal form that a thing has been said, done, or agreed. (4) In evidence, the act of one conspirator performed in pursuance of the common design may be given in evidence against his conspirators. (5) Acts done, distinguished into acts of God (q.v.), of the law, and of men. (6) Legislative acts, enacted by a congress, legislature, parliament, etc. A statute, law, or edict, consisting of a bill which has been successfully carried through Congress, Parliament, or Legislature, and received the approval of the executive or chief ruler. (See *Act*.)

Jurisprudence is the general title covering the entire field of law, the science and study of law, and the knowledge of the laws, customs

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and rights of men in a state or community, necessary for the due administration of justice. The various classifications of jurisprudence (q.v.) alphabetically arranged are as follows:

Admiralty Law in England and the United States is a system of jurisprudence administered by admiralty courts, which have jurisdiction over all marine torts, contracts, injuries, or offenses. Its civil jurisdiction extends to cases of salvage, bonds of bottomry or hypothecation of ship and cargo, seamen's wages, seizures under the laws of imposts, navigation, or trade, cases of prize or ransom, charter-parties, contracts of affreightment between different states or foreign ports, contracts for conveyance of passengers, contracts with material-men, jettisons, maritime contributions, and averages, and generally to all assaults and batteries, damages, and trespasses taking place on the high seas. Its criminal jurisdiction extends to all crimes and offenses committed on the high seas or beyond the jurisdiction of any country. (See ADMIRALTY LAW.)

By-Law is a law of a city, town, corporation or society. (See BY-LAW.)

Canon Law is the body of ecclesiastic Roman law. (See CANON LAW.)

Civil Law is the ancient Roman law, with the various modifications thereof which have been made in the different countries into which the law has been introduced. (See CIVIL LAW.)

Common Law is a rule of action which derives its authority from long usage or established custom, which has been immemorially received and recognized by judicial tribunals. As common law can be traced to no positive statutes, its rules or principles are to be found only in the records of courts and in the reports of judicial decisions. Common law is distinguished from the statute law and from equity. It is wholly overruled by the statute law. (See LAW, COMMON.)

Constitutional Law, a system of law established by the sovereign power of a state for its own guidance; the body of written public law. (See GOVERNMENT; LAW, CONSTITUTIONAL.)

Consuetudinary Law is that law which derives its binding character, not from the expressed, but from the tacit, consent of the general will of the community. As it is generally transmitted orally from age to age, it is often spoken of as the unwritten law.

Criminal Law is that branch of municipal law which relates to crime. (See LAW, CRIMINAL.)

French Law is the name given Norman dialect, or Old French, which was used in judicial proceedings from the days of William the Conqueror to Edward III.

Law of Merchants is the system of law which the courts of England and the United States apply to mercantile contracts. It is a branch of the common law, inferior in importance to no other, and in many respects quite distinct from any other. The principal subjects embraced within it are the law of shipping, including that of marine insurance; the law of negotiable bills of exchange and promissory notes; and the law of sales; all of which topics are treated of in this work specifically. The merchant law has grown up gradually, and, during the larger part of its existence, slowly. It originated undoubtedly in the customs of

merchants. That it stands out in English law more prominently and distinctly than in any other general system of municipal law, may be reasonably ascribed to the greater extent of the commerce of England for many ages. It occupies a similar place in our law, in part because we inherit the law of England, and in part because the same extent of commerce which produced this system of law in England preserves it in the United States. In the earliest records of English law, we have distinct intimations that England in all periods of its history from the reigns of its Saxon monarchs, had many ships and many merchants; that questions in relation to the interests and contracts of merchants came not infrequently before the courts; and that these questions were decided even then by a reference to the customs of merchants, which was sometimes only understood, but in other cases was distinctly expressed. In doing this the courts only obeyed a necessity, which was felt wherever commerce existed and was respected. It is not to be concealed, however, that the courts did this with some reluctance, and by steps which followed each other only at long distances. The reasons for this are obvious, and may be discerned the more easily because they have not yet ceased wholly to operate.

The common law was, at a very early period, a quite complicated but well arranged and exceedingly systematic body of law. To know this was the privilege of a few—to administer it gave wealth and dignity to a very few. The law was then a monopoly, and one of very great value, and it was guarded carefully by those who possessed it. Merchants did not wantonly disregard it; but they were compelled to find, or to invent, for the various exigencies of their commerce, rules and principles different from those which had grown out of the feudal system, and were intended mainly to govern titles to land and the relations of feudal rank, and were admirably adapted for this purpose. When these mercantile contracts came before the courts, the same necessity which had led merchants to find and introduce their new rules, acted upon the courts, and induced the courts, more or less willingly, to accept these rules as their rules also, and thus to make them law. But while some of these rules were only modifications of the existing rules of the common law, others of them were very distinct exceptions, and some were positive contradictions. It was perhaps wise in the courts to regard with jealousy rules of law made by no sovereign authority, and neither evidenced nor promulgated in any authentic way. Nor are we obliged to attribute to mere selfishness of any kind the reluctance of the courts of law to admit these usages to the full force of law, at all periods and even at the present day. But at all times the established rules which governed the business and the contracts of any set of men, must have been recognized as law; and even the Roman civil law acknowledged the binding force of mercantile usage as constituting law. In 1765, Lord Mansfield (q.v.) declared "the law of merchants and the law of the land is the same," and so the customs of merchants became the common law.

Law of Equity.—In England in the 18th century the law courts were divided into courts

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of law and courts of equity. In the law courts the parties were compelled to proceed strictly according to the law and the practice, and the forms of pleading were so intricate that many cases were decided on the pleadings without the merits of the case ever being heard; and often when the cause was heard it was impossible to administer justice on account of the form of action, the parties to the action, and the cause of action on which suit had been brought. In the courts of equity they were not restricted by the technical pleadings; amendments could more readily be granted; the parties to the action could be changed by either dropping some or adding others; and the decree could be framed to meet the particular question involved; so that justice would be done to all the parties interested. After the Revolution the United States adopted the English system; but while some of them have kept strictly to that system and have had distinct courts of law and equity, other States have law and equity administered by the same judges and courts, at one time sitting as courts of law and at another time as courts of equity. Equity is divided into three great classes or divisions: Equitable titles, equitable rights, and equitable remedies. Equitable titles are those which are recognized only by a court of equity, as where, when a person gave value for a chose in action which was assigned to him, the assignment was not recognized at law, as it would violate the rules against champerty and maintenance, but equity allows the assignee to bring suit in the name of the assignor. Equitable rights arise where a guardian enters into a transaction with his former ward a very short time after the ward has obtained his majority. If within a reasonable time the ward returns what he received from the guardian, the guardian will, in equity, be compelled to return the property to the ward. Equitable remedies arise in those cases in which the law recognizes a right but cannot enforce it, as where a contract is made for the sale of a piece of property, if the seller refuses to convey, the purchaser's remedy at law is for damages for breach of the contract; but in equity the court will decree specific performance. (See EQUITY.)

Law of Honor.—(See HONOR.)

Law of Nations.—According to Wheaton this "may be defined as consisting of those rules of conduct which reason deduces, as consonant to justice, from the nature of the society existing among independent nations, with such modifications and deviations as may be established by general consent." International jurisprudence is a science of modern origin. In its present sense the law of nations was quite unknown to the two great states of Greece and Rome. In Greece the amphictyonic council bore in some sort the character of an international tribunal, but it concerned itself chiefly with the internal affairs of the members of the league; the few relations which Greece maintained with foreign nations were defined by special compacts, and the general principles of right were rarely invoked in their adjustment. The works of Cicero, Livy, and other writers of the best age of Rome, contain allusions which imply a recognized law of nations; yet it is certain that the Roman law, as it existed at the dismemberment of the Empire of the West, embodied no system of rules for governing the intercourse of states, or for

deciding questions of right which might arise between them. During the Middle Ages, the pope was often the judge and arbitrator in the affairs of nations. His authority reached its height when Alexander VI. presumed to parcel out the New World to Spanish and Portuguese princes. It is now generally recognized, that Hugo Grotius was the first to give a new form to the law of nations, or rather to create a science of which only rude sketches and undigested materials were scattered over the writings of those who had gone before him. Hallam says that the publication of the treatise by Grotius marks an epoch in the philosophical, and it may be said in the political history of Europe. It was very early translated into various European languages, and great jurists made it the subject of elaborate commentaries. In 1656 it was made the text of lectures on public law in the University of Wittenberg, and in 1661 a professorship was created in Heidelberg for expounding the law of nature and of nations from the writings of its author. The sources of international law are, according to Grotius, natural law, divine law, customs, and special compacts. In the celebrated reply made by the British government in 1753 to a Prussian state paper, the law of nations is said to be founded upon justice, equity, convenience, and the reason of the thing, confirmed by long usage. The principle of national justice, founded upon the laws of morality, is, then, the basis of the positive law of nations, that is to say, of the treaties, conventions, and usages which compose it. It is the office of right reason to apply this natural law of equity to the circumstances of each case; and it is the art of applying this law, according to justice and guided by reason, which renders international jurisprudence a particular science. Treaties and usages offer evidence of the general consent of nations, and are important sources of the law. The customary law of nations is further expressed in manifestos and declarations of war and in the decisions of prize courts. Finally, the concurrent testimony of the great writers upon the science, and the written opinions which official jurists give to their governments, are further evidence and depositories of the law of nations. (See INTERNATIONAL LAW.)

Law of Nature.—Laws and just rules of conduct which the Creator has prescribed to man, as a dependent and social being, and which are to be ascertained from the deductions of right reason. (See LAW, NATURAL.)

Law of the Land is the due process of law; the general, public, or common law of the land.

Maritime Law is the law of the sea; a branch of the commercial law, relating to the affairs of the sea, such as seamen, ships, navigation, etc. (See LAW, MARITIME.)

Martial Law is the law of military rule or occupation. (See MARTIAL LAW.)

Military Law, a branch of the general municipal law, consisting of rules ordained for the government of the military force of a state government, equally in peace and war. (See LAW, MILITARY.)

Moral Law, a law which prescribes to men their social duties. The moral law is summarily contained in the decalogue, written on two tablets of stone and delivered to Moses for the Israelites on Mount Sinai. (Ex. xx.) (See MOSES.)

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Mosaic Law, the institutions of Moses, or the code of laws prescribed to the Jews, as distinguished from the Gospel.

Municipal Law, a rule prescribed by the supreme power of a state, declaring some right, enforcing some duty, or prohibiting some act; a statute; a collection of rules to which men living in civic society are subjected in such a manner that they may in case of need be constrained to observe them by the application of force. (See GOVERNMENT.)

Parliamentary Law is the name given the rules and precedents regulating the procedure of deliberative assemblies. Certain rules of parliamentary procedure have always been necessary for the accomplishment of the purposes for which deliberative assemblies are called. Experience has shown that restrictions must be placed on individual members in the general interest of the whole body; that mere customary rules are insufficient, and hence regular parliamentary codes must be prepared for the government of deliberative assemblies. In both England and the United States parliamentary law has become almost a distinct branch of the law, and its mastery is highly essential to the success of the legislator. The necessary officers of a deliberative assembly are a chairman, usually called speaker, president, or moderator, and a secretary or clerk. It is the duty of the presiding officer to call the meeting to order; to state clearly all questions brought before the assembly; to put motions properly made and in their proper order; to preserve order and enforce the rules of procedure; and decide questions of order subject to the right of appeal to the whole assembly. These are his primary duties, but he may in addition participate in debate, as any other member, and vote in case of a tie. It is the duty of the secretary to keep a record of the proceedings of the meeting, including a correct statement of every motion made and the manner in which it was disposed of; the names of members of all committees appointed; a true copy of every resolution passed with the affirmative and negative votes cast therefor, etc. (See PARLIAMENTARY LAW.) For rules governing debates, motions, appeals, etc., consult Cushing, 'Manual of Parliamentary Practice,' and Roberts, 'Rules of Order.'

The Courts and Law Practice.—For a general survey of judicial proceeding and the methods of courts, see the articles, COURT; JUDGE; JURY; JUSTICE. In the practice of law, especially during the 19th century, many new and distinct phases of legal classifications have arisen, such as Corporation Law, Pension Law, Law of Husband and Wife, Divorce Law, the Law of Negligence, the Law of Copyright, Election Laws, Insurance Law, Mining Law, Liquor Laws, Bankruptcy Laws, etc. These are generally treated under their respective titles.

Plaintiff and Defendant.—The parties to an action in law are called plaintiff and defendant, and the former is said to sue or prosecute the latter, hence the word suit instead of action. In some few instances the redress sought by a civil action consists in the recovery of some specific article of property wrongfully and unlawfully taken by the defendant from the plaintiff, but most frequently the object of an action is to obtain compensation in money for an injury complained of, which compensation is tech-

nically called damages. The action is said to terminate properly at judgment. Civil actions are those actions which have for their object the recovery of private rights, or of damages for their infraction. Criminal actions are those actions prosecuted in a court of justice, in the name of the government, against one or more persons accused of a crime. Transitory actions are those civil actions the cause of which might have arisen in one place or county as well as another. Local actions are those civil actions the cause of which could have arisen in some particular place or county only. Personal actions are those civil actions which are brought for the recovery of personal property, for the enforcement of some contract, or to recover damages for the commission of an injury to the person or property. Real actions are those brought for the recovery of lands, tenements, and hereditaments. Mixed actions are those which partake of the nature of both real and personal actions. (See DEFENDANT; PLAINTIFF.)

Law of Evidence.—Evidence in law may be oral or documentary. Oral evidence is the statements made by witnesses during a trial; and documentary evidence consists in the production of papers, on which is writing, marks, or characters capable of being read, which are submitted during the course of the trial. Oral evidence must in all cases be direct; if it is of something that was seen, by the person who saw it; if of something heard, by the person who heard it; if of an opinion, by the person who holds that opinion; or if the knowledge was acquired in any other manner, by the person who perceived it in that manner. The general rule is that hearsay evidence is not admissible. Documentary evidence may be either primary or secondary. Primary evidence of a document is where the document itself is produced for the inspection of the court. Either oral or documentary evidence may be given of any fact in issue or relevant to the issue. (See EVIDENCE.)

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Law, Civil. See CIVIL LAW, THE.

Law, Commercial. See COMMERCIAL LAW.

Law, Common, in America. The layman who diligently searches the statute books of our several States must not flatter himself that he has so determined his own, or the legal rights and obligations, of his fellow citizens, and, upon that misapprehension, set forth upon such litigious adventures as this assurance would surely provide for him. He may have heard of the common law, and have thought it an obsolete system of jurisprudence, affording an interesting and curious field of study for the antiquarian, but as an active power supplanted entirely by modern statutes, which he assumes to present the whole body of the operative, substantive law. To warn the over-confident student against the consequences of such error, this article may, to some extent, serve a useful purpose. It is intended, however, to set forth briefly, without technical analysis, and in entirely popular form, the origin, development and present influence of that system of administrative law known both to laymen and to the profession under the title of the Common Law; the spirit, the forms and phrases of which still appear in our legislation and in the judicial utterances of the courts of every State of our Union save, perhaps, Louisiana, whose laws have their source in, and take their inspiration rather from, the Code Napoleon, which, in turn, was an offspring of the Roman law. With this exception, and except in the jurisdiction of the Federal Courts of the United States, the principles of the common law have within our Union full vigor and dominion, excepting, always, as they have been expressly modified or annulled by legislation. But even statutes are to be construed in reference to the common law, for it is not to be presumed that the Legislature intended to make any innovation upon the common law further than the case absolutely required, and this rule of construction has been held applicable to acts of Congress, though there is no common law of the United States (Kent's Commentaries, Vol. I., p. 464). The common law must, nevertheless, be invoked in the matter of construction of Federal statutes, for, though its jurisdiction is not conferred upon courts of the United States, where the statutes do not so provide; their powers are purely statutory, but, in their exercise, the Federal Courts give full recognition to the rules of the common law. The same oversight by the common law over legislation was long ago declared by Lord Coke, who held that the common law "doth control acts of Parliament and adjudge them void when against common right and reason."

Even to-day the most important personal or property rights of the citizen may be deter-

mined in our courts upon the authority of some ancient decision recorded in the Year-Books, yet having the same force now as at the time of its enunciation centuries since. And it may further be safely affirmed that no one of the fundamental propositions of the common law relating to the liberties of the citizen, has been wholly abrogated by legislation, the changes in the body of the law by this process having been more by way of development than excision. The sources in which this ancient, but still vigorous, system had its origin are to be sought in a past older than the recorded history of our English ancestors, or of their progenitors. Most of the vital principles which animate its substance may be directly traced to those rules of civil government and those stern precepts asserting personal and property rights first declared by the unwritten law, administered by the rude forest courts of the barbarian ancestor of our Saxon and Norman parents, and already established when Caesar led his victorious legions to the remoter boundaries of Gaul, where, in battle and in treaty, he came to know and respect those sturdy races whose primitive arms and crude laws have developed into, and still actuate, the powers which to-day and for generations have led in the advance of civilization the world over. Born of the rigor and the necessities of their hardy life, reflecting something of their higher aspirations, expressing, it is true, in its inception, the savage principle that made vengeance the impulse to secure the punishment of an evil-doer, or serve to deter one who would do wrong, this system of law has grown with the growth of the people who framed it. As they emerged from savagery, the law moved onward with their progress, and was modified by their enlightenment. The Roman Conquest left the imprint of its civilization and its distinct influence upon the laws of the northern subjects of the empire. So that by the time of William the Conqueror, though the dominant law by which he and followers were governed, and which he brought with him to England, was still essentially that of the German barbarian, there were grafted upon it many of the precepts, and much of the philosophy, of the Roman jurist. The necessities of the people, the teaching of their experience, usage based upon the morality of the time, were the foundations of their system of law; defined by no written code, claiming nothing of the mystery of an inspired origin, human in its every fundamental feature, sustained by the will, the intelligence, and the virtue of the people, from its beginning to the present day, it has had the vitality of human life itself and has survived through all the violent changes and revolutions of religious faith, and has maintained the vigor of its original purpose, the discharge of its intended functions, the establishment of laws for the conduct of human affairs, the determination and protection of personal and property rights, of men dealing and dwelling with their fellows — without which no society could long endure.

Lord Hale has said that the common law of England is "not the product of the wisdom of some one man or society of men, in any one age, but of the wisdom, counsel, experience, and observation of many ages of wise and observing men"; and that "Time is wiser than

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all the wits of the world, and the law which has been tried by it, has its highest possible evidence in its favor."

That system, ancient in the days of Lord Hale's encomiums, approved by the wisdom of the generations who have followed him, is held in obedient reverence to-day, and each succeeding age has added to its substance and spirit, some contribution of learning, the results of new observations, of new experience, and of new enlightenment.

The bibliography of the common law is as wide as the field of its jurisdiction, and a recital of the volumes in which its precepts are recorded would far transcend the necessary limits of this article, nor would it lie within the scope of its intent. The subject has engaged the profound study of scholars, inspired the decisions of most learned judges, and by the evidence of its influence historians have traced the progress of nations. Its commentators have uniformly extolled its wisdom, its beneficence, and its unparalleled power, some even in their earnestness having used those reverential phrases which are appropriate to the Holy Scriptures themselves.

"The judges," Chancellor Kent has told us, "through the whole period of the Year-Books, were constantly urging the sacredness of precedents, and that a counsellor was not to be heard, who spoke against them; and that they ought to judge as the ancient sages taught." "If we judge against former precedents," said Fristot, C. J., "it will be a bad example to the barristers and students at law, and they will not give any credit to the books, or have faith in them."

This adherence to precedent has characterized the slow and conservative development of the system, even to our own time. It is still true that when no statute has expressly abrogated a rule of the common law, it remains the supreme law of our courts, if the facts and circumstances of the particular case make it applicable, even though the source of the rule must be sought in the conflicts of the Saxon sullenly defending his rights against the arrogant Norman baron, or in the controversies of the astute churchmen, who, in spite of hostile statutes, by ingenious turns of argument and construction, defended in the courts lands which they could no longer hold by arms.

A well-considered decision of Chief Justice Holt, Lord Coke, or in later times of Lord Mansfield, has to-day and in our country, all the authority it had when it first fell from the lips of the austere judge and terminated a controversy between litigants whose dust has long since mingled with the English earth. Our courts are bound by the letter no less than by the reason of the adjudication. They must not overrule a decision plainly in harmony with the principles of the law which demanded it, for the function of the court is exclusively judicial, and it may not, because of the apparent hardship of a particular case, usurp legislative power. If the rigor of a rule of the common law bear too hardly upon the citizen, or if it be in conflict with the conscience or conditions of the present day, legislative relief is a sovereign and effectual remedy, and is that which the common law has itself wisely provided, to meet changing conditions and circumstances.

The recorded evidence of the principles of the common law, to which the judges turn for guidance in rendering their judgments according to that law, is preserved in a multitude, ever increasing in numbers, of reports of decisions: first, of the Courts of England, the earliest of which are the Year-Books, black-letter tomes written in crabbed law French, seldom read to-day even by the most studious lawyers, because most of the decisions there recorded have passed by comment and reference into later works, but the decisions themselves are none the less active living factors in the law of to-day. These early reports cover a period of about two hundred years, from the reign of Edward II. to that of Henry VIII. From that time forward, with some early intermission, but later continuously, the adjudications of the English courts of high authority have been carefully, and, for the most part, accurately preserved, and these volumes, with the acts of Parliament, make up the body of the common law as it existed when the American Colonies declared their independence, and as it has been incorporated into our own jurisprudence. The ancient reports are instructive not alone for the letter of the decisions of the judges, but also because they are almost the only written records of the law; the text-books,—indeed, the writers competent to prepare them,—less than in our time, and in many instances, the annotations of the reporter, are the only statements of general legal principles and have the same weight of authority as the judicial decrees because they reflect the real genius of the law itself.

Lord Coke, Chief Justice of the King's Bench in the time of King James, is a notable illustration of this service to the law. His observations, deduced from the decisions in favor of the rights of the subject, and in restraint of royal prerogative, so angered that monarch that he removed the Chief Justice and directed that his commentaries be eradicated from the books, but that which Coke wrote is the law to-day, and the king who would have stayed its progress, might, indeed, be now forgotten except for this impotent effort, which gives him immortality beside King Canute, who, by his royal will, sought to hold back the waves of the limitless sea. This memorable incident of Lord Coke well illustrates that quality of the common law which has enabled it to survive all changes of dynasties and of nations. Royal ambition, popular violence, religious fanaticism, even the tumult of civil war, could not, except momentarily, change the tenor of its way or obstruct its constant advance toward the establishment of a stable, permanent system of justice. Flexible, and adaptable in its external forms, it absorbed in each period of its transition only those elements which were of permanent value. It never retrograded.

Of the ancient law of England, "planted here by the Conqueror," Lord Bacon, when entertaining the vain ambition that he could by his own genius embody all its vital principles within the fixed terms and phrases of a code, said, with rare vigor and felicity of speech: "Now of the laws of England, if I shall speak my opinion of them without partiality either to my profession or country, for the matter

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and nature of them, I hold them wise, just, and moderate laws, they give to God, they give to Caesar, they give to the subject, what appertaineth. It is true they are mixed, as our language, compounded of British, Roman, Saxon, Danish, Norman customs; and surely as our language is thereby so much the richer, so our laws are likewise by that mixture the more complete."

Purified, invigorated, by the best thought and by the experience and intelligence of the generations since Bacon lived, the common law of America, imposed upon us by no "Conqueror," but brought here as their birthright by our fathers, zealously and jealously guarded, and sacred to them as their religion itself, immortal in its vigor and virtue, speaks to-day the very conscience of the state.

It remains only, for the purposes of this article, to briefly trace the processes and channels by which it has become the predominant law of America, wherever the Saxon race has inherited, or after his manner, taken possession of, the earth. If we have in mind our English origin, we shall readily understand why in the deeds by which our lands are conveyed we note a phraseology which had its occasion in feudal tenures, or mark the last struggles of the Roman Church for temporal possession, and why in the courts we still hear the technical words of the pleader used in ancient Westminster Hall, and why we observe the precise and often quaint verbiage of indictments upon which a prisoner is set to trial for his life, to which, indeed, the modern prosecuting officer still adheres with almost superstitious fidelity. Brought over seas by our English ancestors, as the law of England, it, of course, was our law through the Colonial period, and when our conflict with the mother country became inevitable, our patriots invoked the common law, the heritage of all English subjects, as the justification for their action. Their defiance of unconstitutional taxation was not the outbreak of Englishmen reverting to barbarism in the wilds of a new country, or of men impatient of the restraint of just laws, nor was it the outcry of some rabid revolutionary philosophy taught by an alien race, for it was to the constitution of England, embodied in her common law, that the colonists appealed to a king and ministry who had themselves forgotten its precepts. The arguments of the freemen of Virginia or of Massachusetts were the same with those uttered by the liberal nobleman or commoner in the Parliament of England, and the triumph of our revolution was no less a victory for the common law than for the exhausted Americans who had offered their lives and their fortunes to the defense of the principles it had inculcated. Here, again, a king had thought his will more potent than the law, and here again the royal prestige and prerogative met humiliating defeat before the resistless moral force of the law, that had made the people's rights and the constitution the dominant power of government, rather than the arbitrary will or ambition of the sovereign. So sacred to every colonist was this law that in the first intimation of organized resistance to England in the resolutions of the Convention of 1774, it was declared that the colonists were of right entitled to the benefit

and protection of the common law of England, and, as well, to that of the acts of Parliament existing at the time of colonization. As the common law had taught our fathers how to win their independence against a tyranny that ignored it, in gratitude, and seeking the preservation of their liberties through its precepts, it was embodied in the constitutions of the new states, where, proof against the vacillation, the passion, or the precipitate action of popular excitement, it should remain, the impregnable fortress, the last sanctuary, of the liberties of the people.

Through the blood of our ancestors, and by rightful inheritance, the common law is our birthright, which scarce needed, therefore, formal adoption by legislation or by the courts. But, that of record it might appear to all men, and be gainsaid by none, it has been inscribed upon the pages of our written law. The Constitution of Massachusetts declares (Article VI. of Chapter VI.): "All the laws which have heretofore been adopted, used, and approved in the Province, Colony or State of Massachusetts Bay, and usually practised on in the courts of law, shall still remain and be in full force, until altered or repealed by the legislature; such parts only excepted as are repugnant to the rights and liberties contained in this Constitution." Like provision was made in the constitutions of the other original States. The constitution of those States, not existing as colonies, embody by reflection like safeguards for the popular liberty and right, and all directly traceable to the body of liberties of the common law.

The courts, pursuant to the requirements of the constitutions, have declared their perpetual allegiance to the principles of the ancient law. A typical illustration is found in *Commonwealth v. Knowlton* (reported in 2 Mass. Reports, p. 530), where the Supreme Judicial Court declared that "our ancestors, when they came into this new world, claimed the common law as their birthright, and brought it with them, except such parts as were judged inapplicable to their new state and condition. The common law thus claimed was the common law of their native country as it was amended or altered by English statutes in force at the time of their emigration. These statutes were never re-enacted in this country, but were considered as incorporated into the common law. Some few other English statutes passed since the emigration were adopted by our courts and now have the authority of law derived from long practice."

So much, therefore, of the common law of England as our ancestors brought with them, and of the statutes then in force, amending or altering it,—such of the more recent statutes as have been since adopted in practice, and the ancient usages aforesaid,—may be considered as forming the body of the common law of Massachusetts, which has submitted to some alterations by the acts of the provincial and state legislatures and by the provisions of our constitution."

Again, the Massachusetts court, in *Commonwealth v. Churchill* (reported in 2 Metcalf at p. 118), held that the constitutional provision above referred to was to be "construed as adopting the great body of the common law,

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with those statutes made before the emigration of our ancestors, which were made in amendment of the common law, so far as these rules and principles were applicable to our condition and form of government." And in the same case the court declared that it was unnecessary to show affirmatively that such rule or principle had been adjudicated before the Revolution, saying that "before the Revolution we had no regular reports of judicial decisions, and the most familiar rules and principles of law — those which lie at the foundation of our civil and social rights — could not be so proved. No, we rely on usages and traditions, and the well-known repositories of legal learning, works of approved authority, to learn what are the rules of the common law; and we have no doubt that these were the great sources to which the above pregnant provision of our constitution refers."

Though the Constitution of the United States in no words adopts the common law, as part of its composition, its provisions none the less recognize its existence and continuance as the law of the States, with which the National government might not interfere. It was because of a fear that, through the new Federal Constitution, some untried scheme of government might be imposed upon the people and the States, and in order that the old system of law, known and trusted, might still prevail, safe in the will and obedience of those who knew it best, that it was expressly declared that the Federal Government should have in none of its functions any powers save those expressly delegated to it by the Constitution. (*Re Barry*, 42 Fed. Rep., 113, 118, 120.) But, as has been above noted, the Federal Judiciary, trained to the faith of the common law, have uniformly held that even Federal statutes are to be construed in accordance with the principles of that body of law.

So, by the will of the people, wisely and deliberately exercised and manifest by the declarations of our courts and constitutions, the vast and complex, but stable, system of American law, has been builded upon the ancient foundations of the law of England, and the reflecting citizen of the British Empire, though realizing that the prestige of the arms of England was dimmed by the victories of our Revolution, yet is reconciled when he remembers that the same spirit that gave freedom to Englishmen, inspired the American patriots, and that the colonists demanded only that liberty of person and conscience which the common law had taught them was the birthright of all mankind.

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Law, Constitutional, that part of public law which regulates the political organization of a State and so named because usually embodied in a written instrument called a constitution. It is sometimes spoken of as the organic or fundamental law of the State because it is the basis of all other municipal law. It differs from international law in being wholly municipal in character and from administrative law in that it regulates only in a general way, the organization of the government, leaving the details to be regulated by the rules of administrative law. It differs from ordinary statute law both as to its source and method of enactment and as to its content. While statute law is enacted, modified and

repealed by the legislature, constitutional law is usually enacted by a constituent convention especially chosen for the purpose while its validity is, in America at least, usually made to depend upon the approval of the electorate, to whom it is submitted by way of referendum. Hence it is commonly said that constitutional law is enacted by the people, whereas statute law is the work of their representatives. This distinction as to method of enactment, however, is not universal. In some States the same bodies which enact ordinary statute law also ordain and alter the body of constitutional law.

This is true in Great Britain, where the Parliament may alter the constitution in the same manner in which it may enact or repeal an ordinary statute. Likewise in France and in Germany the Parliaments may make amendments to the constitution subject only to the limitation that the French Chambers are required to observe certain formalities which they do not observe in passing ordinary statutes, and in Germany an extraordinary majority is required. In Switzerland the people participate directly in the enactment of their constitutional law, not only through the referendum (q.v.) but also through the so-called initiative by which they are empowered to draw up proposed constitutional amendments and submit them directly to the electorate for approval. For the different types of constitutions see the article CONSTITUTION.

The distinction between the content of constitutional law and that of ordinary statutory legislation is largely one of degree and in the States of the American Union this distinction is fast disappearing. Among the proper subjects of constitutional law are (1) the structure and powers of the government including a distribution of its legislative, executive and judicial functions, among separate and distinct organs; (2) a definition of the class empowered to participate in the choice of elective officers and the method by which that choice is to be exercised; (3) the determination of the qualifications, duties and privileges of those empowered to hold government offices and mandates; (4) the creation of a sphere of individual liberty — usually embodied in a bill of rights — upon which the government is forbidden to encroach, and (5) provision for a legal and orderly method of making changes in the constitution so as to avoid the risks and dangers of revolution. In addition to these subjects which may be denominated the essentials of a constitution scientifically drawn, it is common to incorporate therein various provisions relating to education, patents, copyrights, the army and the navy, the militia, corporations, public debts, rules of judicial procedure, regulations concerning official salaries, taxation and administration, etc., which according to strictly juristic tests are more properly subjects for statutory regulation. The effect of this practice has been to introduce into the domain of constitutional law a considerable amount of private law, thus derogating from the principle that the constitution should be exclusively an instrument of public law. On the other hand the usual difficulty of amending the constitution so as to adapt it to new conditions and exigencies has made it necessary to deal with certain subjects by statutory legislation, although they are properly matters that should come within the province of constitutional law. Notable instances are statutes for the government of dependencies. Thus

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the ordinance of the old Confederate Congress of the United States, passed in 1787, for the government of the Northwest Territory, the various statutes for the organization of the other Territories of the United States, the acts for the government of the Philippine Islands and Porto Rico were of the nature of constitutions of government for the dependencies to which they applied. They were mainly instruments of constitutional public law, although cast in the form of statutes.

A final distinction between constitutional law and statute law is the element of paramountcy which belongs to the former. In all countries where constitutional law is a separate and distinct body of jurisprudence its prescriptions take precedence over all statutory enactments in case of a conflict between the two. In such cases the conflicting statute is said to be "unconstitutional" and is treated as invalid. The power of determining the fact of irreconcilability has been assumed by the judicial branch of the government in the United States and has been so long acquiesced in that the power will probably never be questioned, although it is not expressly conferred by the Constitution. In none of the continental European countries have the judiciaries assumed such power, and in England the "constitutionality" of an act of Parliament can scarcely arise, since that body is legally omnipotent. The rules for the construction of the prescriptions of constitutional law are essentially the same as those for the construction of statutes except that constitutions are more strictly interpreted and constitutional commands are more often construed as mandatory where similar provisions in statutes would be treated as directory only.

In the United States, and in fact in all countries having the federal form of government, there are two bodies of constitutional law, namely, that which is national in scope and that which is local, the former being paramount to the latter in case of conflict. In the United States that part which is federal or national consists of the Constitution "established and ordained by the people" in 1788, including the subsequent amendments thereto, together with the interpretations of the federal judiciary and the usages and customs which have grown up in connection with the administration of the government. Among the important principles which have been developed as a result of judicial interpretation may be mentioned the right of the government to acquire and administer foreign territory, the immunity of the national government, its instrumentalities and agencies from taxation by the States, the right of the government to issue legal tender paper currency both in time of war and in time of peace, the exclusive power of Congress over foreign and interstate commerce, the exclusive power of the States over all matters relating to the suffrage subject to the limitations of the 14th and 15th amendments, the right of the National government to undertake internal improvements, the right of the courts to declare laws unconstitutional, the right of Congress to abrogate a treaty, etc. Among the usages which have become for all practical purposes a part of Federal constitutional law may be mentioned: the ineligibility of the President for a third term, the obligation of presidential electors to vote for the party nominees, the power of the President to remove his appointees without the

consent of the Senate, the method of legislation by the committee system, the requirement that representatives in Congress shall reside in the districts from which they are chosen, etc.

Likewise the constitutional law of the individual States is embodied in written constitutions, in most cases prepared by constituent assemblies and approved by the electorate upon referendum, together with the amendments thereto and the interpretations of the State judiciaries. Several of the early State constitutions were prepared and put into effect by the legislatures or by irregular revolutionary assemblies without popular ratification.

With one exception (Delaware), no alteration can be made in any of the existing constitutions without the approval of the people at the polls, and but three of the constitutions now in force were put into effect without ratification by the electorate. The earlier constitutions were brief instruments containing but little more than the law for the organization of the government and the necessary safeguards for the protection of individual liberty, but the later ones are bulky documents containing a vast amount of private law relating to matters which are properly subjects of statutory regulation. This increasing tendency to amplification has resulted from the popular distrust of the State legislatures and the consequent desire to place the regulation of many matters beyond the power of the legislature to alter or repeal it. The effect has been to destroy in a large degree the scientific distinction between constitutional law and statutory law, to retard the constitutional development of the commonwealth, and to add confusion to the task of the student and the practical constitutional lawyer.

In Great Britain the existing body of constitutional law differs in several respects from that of the United States. In the first place it is not so much the result of revolution nor is it so nearly the finished product of a constituent assembly. It is more the product of evolution and growth and is more largely unwritten than that of the United States. Moreover, what is written is scattered through different acts instead of being contained in a single compact instrument. Finally, the Parliament being the chief source of constitutional as well as of statutory law there are no juristic tests upon which a distinction may be founded—a fact which has led Mr. A. V. Dicey, one of the most learned English commentators, to declare that the constitutional law of England is a "sort of maze in which the wanderer is perplexed by unreality." He questions whether English constitutional law is really law, and expresses the opinion that it is only a cross between history and custom, undeserving of the name of law. As the term is used in England, he says, it includes all rules which define the members of the sovereign power and regulate their relations to each other, which determine the mode in which the sovereign power is exercised, which prescribe the order of succession to the throne, which regulate the prerogatives of the chief magistrate, determine the form of the legislature, define the territory of the state, etc. Such of these rules as are enforced by the courts he calls collectively the "law of the constitution." The others which consist of understandings, habits or practices, and which are not enforced by the courts, he calls the "conventions of the

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constitution," or constitutional morality. To the former class belong the rule as to the irresponsibility of the king and the responsibility of his ministers; to the latter belong the rules relating to the executive veto, the initiation of revenue bills and the resignation of ministers. Monsieur Boutmy, a learned French commentator on the British constitution, points out that the principal sources of the constitutional law of England are: (1) Treaties or quasi-treaties, such as the Acts of Union; (2) the common law; (3) solemn agreements, for example, the Bill of Rights; (4) statutes. Of the other European countries the constitutional law (*Staatsrecht*) of Germany is most nearly like that of the United States as to its source, content and dual character. The constitutional law of the French Republic may be dismissed within a sentence. It is embodied in a brief instrument of a few hundred words, contains a bare outline of the organization of the government, does not contain a solitary provision in behalf of individual liberty, and any part or the whole may be altered by the legislature at will.

Bibliography.—Anson, 'Law and Custom of the Constitution'; Burgess, 'Political Science and Constitutional Law'; Boutmy, 'Studies in Constitutional Law'; Cooley, 'Principles of Constitutional Law'; Dicey, 'The Law of the Constitution'; Story, 'Commentaries on the Constitution'; Lebon, 'Das Staatsrecht der französischen Republik'; Labaud, 'Das Staatsrecht des deutschen Reiches.'

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Law, Criminal, is the whole body of legal rules and provisions affecting the commission and prosecution of crime. In this article we shall deal only with the general principles of criminal law, as it has also been treated under the titles, COURT; CRIMINOLOGY; LAW; LAW, NATURAL, etc., and under special cases such as MURDER, PERJURY, THEFT, etc.

The theories and doctrines of criminal law are, perhaps, more thoroughly based upon the principles of natural law (q.v.) than any other branch of legal science. The earliest conception of criminal law could not have taken place long after Cain killed Abel, for it seems to rest upon the principle of vengeance, which is born of even animal instinct. The law of retaliation is older than history, and the idea of amendment for every injury is a part of human nature. All the religions in the world's history have never been able to teach men to "turn the other cheek," but they have always willingly observed the law of "an eye for an eye, a tooth for a tooth."

The doctrine of criminal law is that the commission of an unlawful act not only requires the guilty person to make proper amendment in some form to the injured party, but that he shall also suffer just punishment at the hands of the state, in order to prevent the repetition of the crime, as well as to make an example him which would tend to deter others from the commission of crime in general. One of the objects of criminal law is to reconcile the rules of procedure with natural justice so as to insure the safe conduct and tranquillity of the state. It embraces the whole body of rules defining the doctrine and the acts of criminal offense; it prescribes for the apprehension of persons charged with crime, the proper procedure for

the trial of such persons, and their just punishment when found guilty. Many conflicting views exist among jurists in relation to the interpretation of criminal law, and there is a strong tendency to codify this branch—for instance, in the State of New York the Penal Code defines criminal offenses and provides for punishment, but it is left for the Code of Criminal Procedure to regulate the apprehension and trial of those charged with the commission of crime. Many of the State constitutions and the Constitution of the United States contain what is practically a codification of the laws regulating criminal procedure.

In ancient times and in the Middle Ages the law exercised the right of public vengeance, which had for its chief object the intimidation of the wrongdoer, and resorted to a great variety of grotesque and revolting punishments. The element of example, however, was not wanting, for the most horrible executions, chastisements, and tortures were devised and carried out in public places for the edification of the curious, whose minds must have been impressed with the horrifying spectacles. But in the 18th century a more enlightened jurisprudence opposed the old theory of public vengeance, and advanced the principle of a legitimate defense restrained within the limits of common interest. It was then, for the first time, recognized that the true and right object of criminal law should look to the amendment of the criminal, the amelioration of his condition, and the ultimate restoration to him of the rights of a free man, thus giving back to the world—not a criminal, but a good and useful citizen. From this standpoint, many members of the legal profession are opposed to capital punishment; and some are against corporal punishment, on the ground that it degrades the criminal and deprives him of all sense of pride and ambition, thus permanently unfitting him for making a return to the world of free society. Both in England and in the United States constant efforts are being made to reduce the number of capital offenses.

Everyone is amenable to punishment for crime, with the exception of infants and those of unsound intellect. And this latter exception is limited; it does not prevail in the case of a person committing crime in a lucid interval. Sometimes the fatuity of old age may save a person from punishment, and punishment is remitted in the case of a person who, although not an absolute idiot, is so weak as to be incapable of understanding the difference between right and wrong. Drunkenness is no excuse for the commission of crime, even if it has produced insanity at the moment of committing the crime. But if drunkenness is only the remote cause of the insanity, and the person is not at the time under the influence of liquor or drugs, the law gives him all the consideration that it would give to any other insane person. The cause of the insanity makes no difference; it is the fact *per se*.

A wide latitude in meting out punishment to those found guilty of crime is wisely permitted the judge, on account of the infinite variety of extenuating or aggravating circumstances which surround many cases. It can readily be seen that no code of laws could be made providing for exact or prescribed degrees of punishment, without thwarting the intentions of justice. And so the sentence is left in great measure to the discretion of the Court.

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The details of procedure in criminal cases vary to some extent, according to the crime charged, but are substantially the same in all cases. After the warrant of arrest has been issued and the person charged with the commission of crime is apprehended, he is examined before a justice, at which time he may call witnesses in his defense. The justice may, according to his opinion of the evidence, discharge the accused, commit him to jail to await trial, or admit him to bail. The first step in the trial is the presentation of an indictment to the grand jury. The grand jury having been sworn by the judge, and having heard the witnesses, finds a "true bill" if they are satisfied that there is a *prima facie* case. The cause then goes to trial in open court before a judge and jury. The accused is entitled to counsel, and in case he cannot afford to engage counsel of his own choosing, the State (the judge) assigns counsel for him. The first proceeding is the selection of the jury (q.v.). When all of the twelve seats are filled, the jury is sworn and counsel for the prosecution opens the case. He may be private counsel, engaged by the parties bringing the action, but more often is the public prosecutor—the district-attorney. He examines the witnesses for the prosecution, bringing out all the salient points of the accusation. These witnesses are then cross-examined and re-examined under the rules of evidence (q.v.). Counsel for the prisoner then states the defense and examines witnesses, who are in turn cross-examined and re-examined as before. Then comes the summing up, first by counsel for the prosecution, then by counsel for the defense. The judge then sums up the case and charges the jury, instructing them in points of law on which the case may depend. They then retire and bring in the verdict, which must be unanimous. If they bring in a verdict of guilty, the prisoner is either sentenced or remanded for sentence; if not guilty, the prisoner is discharged. If the jury cannot agree on a verdict, they bring in a "disagreement," and the prisoner is remanded for a new trial. The prisoner has a right to be present during the trial, but should he so conduct himself as to make it impossible to proceed with the case, the Court may conduct it in his absence. The prisoner then has to face the additional charge of contempt of Court. See articles under titles mentioned in first paragraph of this article; also ACCESSORY; COURTS, MILITARY; INDICTMENT; INSANITY; LAW, MARITIME. Consult: Blackstone, 'Commentaries on the Laws of England'; Archbold, 'Pleading, Evidence and Practice in Criminal Cases' (1900); Bishop, 'New Criminal Law' (1900); Harris, 'Principles of Criminal Law' (8th ed. 1899); Phillips, 'Comparative Criminal Jurisprudence' (1899).

Law, Customary. See CUSTOMARY LAW.

Law, International. See INTERNATIONAL LAW; AMERICAN DIPLOMACY; UNITED STATES, DIPLOMACY OF.

Law, Natural. Many laws have been found necessary to regulate the conduct of man in his various relations to society which are more or less arbitrary according to the requirements of localized conditions, but underlying them all are the laws of nature.

If a man kill an animal, and eat of its flesh,

he has no reason to conceal the act; he goes his way with a full stomach and a clear conscience, and no one charges him with the commission of crime. He has simply conformed to the law of nature and answered the instinct of self-preservation. But if a man kill another man, his whole deportment, and even the expression of his features, indicate the consciousness of guilt and fear. Natural law might be said to be the law dictated by conscience, not law deduced from man's education and experience in the world—law regulating his own general rights and duties in relation to the moral government of God, or Nature, and his own moral capacity and accountability.

So natural law covers a man's duty to God, or Nature—the duties of man toward himself, such as self-preservation, temperance, etc.; the duties of man toward other men, or duties which arise from his relations to others near or dear to him; and finally the duties of man, generally and politically, to universal society, especially to the community in which he lives.

At different periods of the world's history men have had various conceptions of justice. Self-preservation was the basis of law among the Sophists of Greece and the Epicureans; the Stoics believed that natural law was founded upon reason and used the term "rational law." Aristotle conceived natural justice to be partly legal (made by man) and partly natural (dictated by God).

Natural law, or *jus naturale*, as defined by Roman philosophers and jurists, is that law which is naturally discerned by right reason, as opposed to the law found necessary and made by man for the safe conduct of the state under localized conditions, or by agreement for the preservation of international rights. Later, however, they distinguished *jus naturale* from *jus gentium*, the former being known by Ulpian's definition, "Natural law is that which nature has taught all living things," and the latter including the laws of expressed or implied agreement between men, or humanistic laws. Aristotle interpreted natural law simply as the law of nations; the Stoic conception was that natural law makes all men free, but that the law of nations permits slavery. The Epicureans thought that commercial trade or profit-making came under natural law. In the administration of Roman justice, natural law was often referred to in justification of an act of judgment, but the validity of a Roman law was never questioned because opposed to natural law.

During the Middle Ages natural law seems to have been considered mostly in its humanistic aspect, that is, in its acquired or necessary application to particular conditions. And in the development of English and Continental law there is seen to exist a stronger inclination to consult the flexible laws of human reason rather than the immutable rules of natural law.

During the 18th century the theories and doctrines of natural law formed an important part of the discussions in relation to jurisprudence, politics, and political economy. This was particularly true in relation to the rehabilitation of the laws relating to liberty, personal rights, property-holding, etc. But in the end utilitarianism played a more important part in the period of legal reconstruction and reform. When jurisdiction passed from ecclesiastical authorities to the people at large, the popular

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theory that consciousness is the true interpreter of law (consult the writings of Marsiglio of Padua), in spite of its moral allurements had to be suppressed to the extent of eliminating its natural anarchistic possibilities. In England the populace gained the privilege of participating in the constitution of government mainly through the forced recognition of the natural-rights theories which they had long asserted against the crown.

The theory of natural law has ever had its adherents and its enemies. One reaction against it was notably set forth by Hobbes (q.v.). It can be variously construed, according to the philosophical reasoning of the definor. Some one reasons that polygamy is against natural law, another claims that marriage should never exist at all; this one claims that it is natural for man to worship a Supreme being, that one says that all religion is superstition and human weakness, and is not a natural desire. And so, what is a natural law to one may not be so interpreted by another. Unless, indeed, we assume that fundamentally all men's consciences are the same, the interpretation of natural law is dependent upon the moral sensibilities of the individual. See JURISPRUDENCE.

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Law, Maritime, a system of established legal rules which particularly relates to the affairs and business of the sea, to ships, their officers and crews, navigation, and to marine conveyances of property. The character and pursuits of marine life, and the commerce related thereto are of a nature peculiar to themselves, and these distinctive features were recognized at a very early period in the history of the civil and the common law, and were noted under the collective term merchant marine.

The ships of a nation are considered as a part of its territory wherever they may wander in the pursuits of commerce. Many of the most important principles of international law grew out of maritime transactions between the various countries of the world, and these principles are as sacred and as rigidly enforced as any of the laws founded upon the comity observed between the different powers. While the great mass of maritime law is the same in all commercial nations, yet in each country peculiarities exist as to some of its rules, and as to the manner in which they are enforced. These differences are owing in a large measure to the municipal laws of the various countries, and as a general rule affect only their own merchants or people in their relations to each other; whereas in matters affecting foreigners the law of the whole commercial world is rigidly observed and enforced. Any nation may adopt its own maritime code but still the mutual relations of commerce and intercourse demand that in all essential things there be a well established and generally observed uniform law founded on natural reason and justice. But every nation reserves the right to make such modifications as locality, the changes wrought by time, and the genius of its people and institutions may demand. The maritime law of each nation may be regarded as distinctively its own; the laws adopted by the respective maritime nations make the basis and groundwork of what is recognized as the maritime law of the world; and the laws of the dif-

ferent countries may have their local distinctions and peculiarities without affecting the general and harmonious integrity of the system, as the differences affect only their own citizens.

The High Court of Admiralty erected in England by Edward III. was of very extensive jurisdiction, embracing all maritime matters. The court has existed ever since in some form, although many modifications have been made. Many of the principles of the English maritime court were adopted by the United States when the separation from the mother country took place, in much the same manner that the English common law was adopted by this country. In the United States the Federal courts, more particularly the United States district courts, have jurisdiction in marine matters, both civil and criminal, the jurisdiction of the latter being original, and that of the Circuit and Supreme courts being appellate only. The jurisdiction of the Federal courts extends to navigable rivers of the United States, whether tidal or not, the lakes, and the waters connected therewith; and it has been decided that the jurisdiction of the Federal courts extends to navigable waters of a river lying entirely within one State. It has also been held that French consuls had no jurisdiction within the States, in matters of admiralty relating to French vessels. It has been conceded by the Federal courts that State laws upon the subject of pilotage conferred upon the State courts concurrent but not exclusive jurisdiction with that of the Federal courts.

It is difficult to conceive of a matter connected with marine affairs which has not been provided for in our marine laws, rules, and regulations, or by the decisions of our courts. On the civil side all matters relating to collisions, freights, charter-parties, demurrage (q.v.), salvage (q.v.), bonds of bottomry and respondentia or hypothecation of ship and cargo, seizure under the laws of impost, prize matters, general average, adjustments, libel for seaman's wages, or libel for other causes, liens for labor or materials, furnished for building or repairs upon marine crafts or for marine works, injuries to seamen, negligence of master or owners, surveys of vessels, towage, wharfage, jettison, marine contributions, dockage, and other kindred subjects are taken charge of and adjusted. Under the civil proceedings one of the most important in extent and complication is the law relating to customs. Through the customs and revenue regulations are derived immense sums of money, as a revenue for government, but an important provision connected with them is a fund which is expended in the maintenance of hospitals for the care of sick and injured marines. The admiralty laws have also a criminal jurisdiction, which extends to all crimes and offenses committed on the high seas, beyond the jurisdiction of any country, such jurisdiction, as generally understood, covering a marine league, or about three miles. The criminal jurisdiction of the United States admiralty court extends to the Great Lakes, as it has been held by the courts that the open waters of those lakes are high seas within the meaning of the statute of the United States. A crime committed on board a vessel in one of our navigable rivers would not give the Federal courts jurisdiction of the offense, but such an offense would be cognizable in the courts of the State within which it was

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committed. An effort has been made, with a good degree of success, to make the practice in our courts uniform in marine matters, so that an action may be heard and determined in the same manner in one State that it would be in another, without being subject to the great and often embarrassing differences which prevail in the different State courts.

It is one of the chief merits of our marine law that it aims to care for our seamen in all of their relations to the hazardous business in which they are engaged. The term mariner includes all persons employed on board vessels during a voyage to assist in their navigation and preservation, and to aid in the purposes for which the voyage is undertaken. This includes masters, mates, sailors, surveyors, carpenters, coopers, engineers, firemen, pilots, waiters, male or female etc. The term shipping applies to all sorts of craft, whether propelled by wind, steam, or other power. It is true that there are certain rules and regulations which, from the necessity of the circumstances, apply specially to craft propelled by steam which do not apply to those which depend upon the wind to send them forward. The United States Congress has enacted laws by which both steam and sailing vessels are to be built, registered or enrolled, manned, victualed, and navigated. Those laws show a constant aim toward a more humane and enlightened treatment of the common sailor than formerly prevailed, and which in some countries prevails to-day. When an American seaman is discharged in a foreign country even with his own consent, or when the ship is sold there, and her company discharged, three months' extra pay is by our laws required to be deposited in the hands of the American consul for the seaman's benefit. Recent laws have prohibited the infliction upon sailors of corporal punishment, once so common, and which doubtless was sometimes as severe as that described by Dana in his 'Two Years Before The Mast.' Many other changes in the interest of the common sailors have been enacted by Congress, with a view to promote their health, comfort, and financial welfare. The master of a vessel, often called "ship's husband," while on voyages at a long distance from the home port, or the place where the vessel is owned, is charged with great responsibility, and he is clothed with an authority commensurate with that responsibility, to enable him to act promptly and efficiently in times of emergency and peril. He has full control of the ship and its cargo. He may abandon the vessel or lighten it by throwing the cargo or some portion of it into the sea. In case of shipwreck from which some portion of the cargo is saved, or the ship brought to land in a damaged condition, in the absence of an opportunity to communicate with the owners, he may sell such property as has been saved from the wreck when prudence or circumstances require it, and he has the right to decide what ought to be done under the circumstances. In case of necessity he may, in the absence of opportunity to communicate with the owners, raise money by bottomry loan on the ship or her freight, or by respondentia on the cargo, or upon them all, by bonds pledging them at a high rate of interest, known as marine interest. Such bonds are to be paid when the ship arrives at her destination or at some designated port. If she does not arrive it follows that the bond is

not good and payable. The holder of such bond acquires an insurable interest in the property so pledged, and may secure his loan in an additional manner by insurance. The master may make contract for repairs upon his ship, when beyond the reach of prompt communication with the owners, and his reasonable contracts so made will be binding upon the owners. It not infrequently happens that serious questions arise as to the necessity for any repairs, or as to the extent of such necessity. Such questions may be obviated, in any American port, at least, by the master calling for a survey. The proper course for a master to pursue when within reach of a court of admiralty is to apply to it for directions how to proceed, and the directions of the court will furnish him full immunity when faithfully followed.

Salvage is an important and interesting provision in maritime law. It is such compensation as may be justly due to persons by whose voluntary assistance a ship or its cargo has been saved for the owners when in great peril, or after being abandoned by the officers and crew. The right to salvage depends solely upon the question whether the property has been saved from the perils of the sea. The amount of salvage to which the salvors will be entitled depends very largely upon the extent of the risk or the perils to which the property was subjected, and the perils of making the rescue. In most of the cases reported our courts have given one half of the value of the property saved; in some instances a larger percentage, and in a few cases an award of seven-eighths has been given. Somewhat akin to salvage is the subject of contribution. It sometimes becomes necessary to lighten a ship in a storm by throwing overboard a part of the cargo. If the cargo belongs to several persons and the portion so thrown overboard belongs to one or to only a part of the owners, those whose property has been saved from impending danger by the jettison, as the throwing overboard is called, are required to contribute to the loser in what is termed general average. Demurrage is an allowance for damage by the detention of a vessel. A master is always obliged to proceed with such despatch as he can consistently with safety, and a merchant or other person who loads a vessel or receives a cargo is bound to give it reasonable despatch. It is usual in a charter-party, or verbally, to provide for the number of lay-days in which a vessel shall be loaded or discharged, and for every day in excess of the number so specified the person responsible for such delay is required by the law merchant to make proper compensation.

Consult: Benedict, 'Admiralty Law'; Parsons, 'Treatise on Maritime Law' (1858); Pritchard, 'Digest of Admiralty and Maritime Law' (1887); Abbott, 'Law of Merchant Ships and Seamen' (1903); 'American and English Encyclopædia of Law'; article "Admiralty." See ADMIRALTY LAW; BOTTOMRY; CHARTER-PARTY; COLLISION; FLOTSAM, JETSAM, AND LIGAN; HIGH SEAS; MARINE INSURANCE; RESPONDENTIA; SEAMEN; SHIPPING.

Law, Military, a term which applies to and includes such rules of action and conduct as are imposed by a state upon persons in its military service, with a view to the establishment and maintenance of military discipline. It is largely, but not exclusively, statutory in character, and

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prescribes the rights of, and imposes duties and obligations upon, the several classes of persons composing its military establishment; it creates military tribunals, endows them with appropriate jurisdiction and regulates their procedure; it also defines military offenses and by the imposition of adequate penalties, endeavors to prevent their occurrence.

Distinction Between Military and Martial Law.—It is proper to observe, at this point, that the terms *military law* and *martial law*, though frequently confused, are by no means synonymous. Military law is in great part statutory in character and regulates the conduct of military persons at all times and in all places, without as well as within the territorial jurisdiction of the United States; that is, military law is applicable to certain persons, not only in time of peace, but in time of war as well, and its operation is not restricted to the territory of the United States, but follows its forces wherever they may go in the performance of lawful military duty or in the prosecution of a legitimate and duly authorized military undertaking. The Naval Articles of War, for example, do not cease to be binding upon the officers and men who constitute the crew of a vessel of war, when they pass from the territory of the United States into the high seas; indeed, by the comity of nations, those laws continue to be operative while such vessel is in the territorial waters of a foreign state. So, too, the Articles of War continue in force and have extra-territorial operation when any portion of the constitutional military forces enters foreign territory in the prosecution of a war lawfully declared by the Congress. The military laws of the United States had the same binding force in the armies of Generals Scott and Taylor while operating in Mexico that they had in respect to those portions of the army which remained within its territorial jurisdiction during that period. Military law has, also, chiefly to do with the acts and relations of military persons; it applies to the conduct of citizens in an exceedingly limited number of cases, in each of which there must be the express authority of an enactment of Congress.

Martial law, on the other hand, is not statutory in character, and arises, in every case, out of strict military necessity. Its proclamation, or establishment, is not expressly authorized by any of the provisions of the Constitution; it comes into being, as will hereafter be seen, only in the territory of an enemy in time of war, or in a part of the territory of the United States in which the proper civil authority is, for some controlling reason, unable for the time to exercise its proper functions. In the former case it is known as *military rule* or the *law of military occupation* and, as such forms a part of the Law of Nations. It disappears when such forcible resistance to the operation of the law has been overcome, or has ceased to exist, and the civil authorities have been enabled to resume the exercise of their appropriate functions.

Other Sources of Military Law.—While military law is in great part statutory, it is the

function of the higher civil courts to interpret the statutes enacted by the Congress, and to apply them to cases arising in connection with their execution: and the decisions of such courts are of equal authority with the statutes upon which they are based. Among other forms of written military law may also be mentioned the decisions of the President and Secretary of War in military matters; the opinions of the Attorney General and of the Judge-Advocate General; the general regulations of the Army and the general orders of the War Department. There is also a body of well established usages known among military men as "customs of war," which correspond, in binding force, to Customs at Common Law.

Courts-martial.—Military Law is enforced by means of certain tribunals, created for the purpose, called Courts-martial. These tribunals are created by the order of a proper convening authority, and are empowered by statute, to determine challenges, to try accusations against military persons, to reach findings of guilt or innocence respecting the same, and to impose appropriate sentences. Their sentences, however, have no legal validity, being in the nature of recommendations merely, until they have received the approval of a military commander, designated by law for this purpose, called the *reviewing authority*. With such approval or confirmation, however, their sentences become operative and acquire the same sanction as the sentences of civil courts having criminal jurisdiction, and are entitled to the same legal consideration. Courts-martial are classified, in accordance with their jurisdiction, into *General* and *Inferior Courts-martial*; the latter term including the Regimental and Garrison Court-martial, and the Summary Court.* The General Court-martial is the highest tribunal known to military law, and has the most comprehensive jurisdiction in respect to both persons and cases. It may try any person subject to military law for any offense over which such tribunals are given statutory jurisdiction. The jurisdiction of the minor courts is restricted as to the persons and cases triable by them, and as to the punishments which they may impose upon conviction.

Courts-martial differ from civil tribunals having criminal jurisdiction, not only in the nature and extent of their jurisdiction, as will presently be seen, but in the manner of their creation. Civil courts, whether of general or special jurisdiction, are created by statutes, which define their composition, endow them with appropriate jurisdiction, and determine the times when, and the place or places where their sessions shall be held. Courts-martial, on the other hand, though authorized by statute, are created, in every case, by proper military orders, issued by commanding officers having authority, under the Articles of War, to call them into being. When the cases referred to them for trial have been completed, or, in certain contingencies, at the discretion of the appointing power, they are dissolved by the authority that created them and simply cease to exist as military tribunals.

* The several military tribunals now authorized are shown in the following table:

Those having power to try and sentence:

{ The General Court-martial—Complete jurisdiction.
The Regimental Court
The Summary Court } Limited jurisdiction.
The Garrison Court

Those having power to investigate merely:

{ The Court of Inquiry.
The Regimental Court for doing justice.

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The General Court-martial.—This court has the most extensive jurisdiction, both in respect to persons and cases, of any of the tribunals authorized by the Articles of War. It may try any military offender, whatever his rank, for any act made an offense by military law. This court may be convened at any time by the President, or by the Secretary of War acting in his behalf, by a general commanding a territorial division of an army in the field, or by a general or colonel commanding a separate territorial department. If the convening officer be the accuser or prosecutor, however, the court is convened by the President. In time of war two classes of persons are given authority to convene general courts-martial—commanders of divisions and commanders of separate brigades. This provision applies to the tactical organization of armies in the field, as distinguished from the geographical organization of military divisions and departments into which the territory of the United States and its insular possessions is habitually divided in time of peace.

Composition.—The statutes authorizing the several military tribunals known as courts-martial—contain the requirement that they shall be composed of *commissioned officers*—a term applied to persons in the military service, of and above the rank of additional second lieutenant, who have been appointed by the President, with the advice and consent of the Senate, and whose appointments are evidenced by commissions under seal, signed by the President and countersigned by the Secretary of War. The law requires that “general courts-martial may consist of any number of officers, from five to thirteen inclusive; but they shall not consist of less than thirteen when that number can be convened without manifest injury to the service.” Such judicial powers, therefore, as are vested by statute in a general court-martial become operative and may be fully exercised by a properly constituted tribunal composed of at least five members. A less number is without power to enter upon the trial of a case, to proceed with a trial already begun, or to perform any act of a judicial nature. The number of officers who shall compose a particular court is determined, in conformity to the terms of the statute, by the proper convening authority, and his conclusion in that regard is final.

The Judge-Advocate.—All courts-martial having general, as distinguished from summary jurisdiction, are provided with officers, detailed for the purpose by the proper convening authority, whose duty it is to prosecute cases coming before them in the name of the United States. The appointment of these officers is vested by statute in certain convening officers, who, as a consequence of their power to appoint courts-martial, are authorized to appoint judge-advocates for the same. The office of judge-advocate is a temporary employment created by statute; the general duties of the office are defined in the Articles of War, which empower the judge-advocate to prosecute in the name of the United States. Other statutes and regulations confer upon him the power to summon witnesses and in certain cases to compel their attendance by the issue of compulsory process. The law, regulations, and the custom of service thus vest in the judge-advocate the duty of preparing the case for trial and charge him with the responsibility of conducting the prosecution. In addition to

his duty as prosecuting officer in behalf of the United States, the Articles of War provide that the judge-advocate “shall so far consider himself counsel for the prisoner as to object to any leading question to any of the witnesses, and to any question to the prisoner, the answer to which might tend to criminate himself.” The duty of the judge-advocate toward the accused should not be regarded as confined to the limited province of “counsel for the prisoner” as the same is defined in the Articles of War. Where the accused is ignorant and inexperienced and without counsel—especially where he is an enlisted man—the judge-advocate should take care that he does not suffer upon the trial from any ignorance or misconception of his legal rights, and has full opportunity to interpose such plea and make such defense as may best bring out the facts, the merits, or the extenuating circumstances of his case.

Council.—An officer or soldier put upon trial before a court-martial is not entitled, as of right, to have counsel present with him to assist him in his defense, but the privilege is one which is almost invariably conceded; and where it is unreasonably refused, such refusal may constitute ground for the disapproval of the proceedings. A court-martial, however, is not required to delay an unreasonable time to enable an accused to provide himself with counsel.

The Interior Courts-martial.—The Regimental Court-martial.—The Articles of War provide that “every officer commanding a regiment or corps shall be competent to appoint, for his own regiment or corps, courts-martial, consisting of three officers, to try offenses not capital.” In addition to the commanders of regiments, properly so-called, the chiefs of such of the Staff Corps as include enlisted men in their personnel may convene these courts at posts or places occupied by troops under their direct military control and command. The strictly criminal jurisdiction of this tribunal having been transferred to the Summary Court by a recent enactment of the Congress, its functions are now largely restricted to cases which involve the redress of grievances alleged by enlisted men to have arisen in the administration of the commands to which they belong. It can now be lawfully convened for the trial of a soldier only in a case, properly referable to a Summary Court, in which the party defendant, being a non-commissioned officer, formally requests that the charges against him be passed upon by a regimental court-martial, or when such trial has been authorized by the officer competent to order the trial of the accused by a general court-martial.

The Garrison Court-martial.—While the Garrison Court-martial has the same jurisdiction in respect to offenses as the other inferior courts recognized by the Articles of War, its jurisdiction as to persons is considerably more extensive, and it may try enlisted men of any corps or arm of the service who are attached to, or form a part of, the command of the officer who has power to convene it. The regimental and garrison courts are each composed of three officers and, like the general court, are provided with judge-advocates whose duty it is to prosecute in the name of the United States: his duties have already been described. Their procedure is the same as that of the general court save that the testimony is not recorded.

The Summary Court.—This court is composed

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of a single officer and may be convened "by the commanding officer of each garrison, fort or other place, regiment or corps, detached battalion, or company, or other detachment of the Army." The court may be appointed, however, and the officer who is to compose it may be designated by superior authority—that is, by the brigade, division, department, or post commander—when such a course is by him deemed either proper or desirable. The terms of the statute in respect to its constitution are thus seen to be extremely general and authorize the court to be convened by the commanding officer of a fort, camp, or other place, the garrison of which is composed of troops of the same or different corps; or by the commander of a regiment, battalion, separate company, or detachment in the field, without restriction as to its composition, for the trial of enlisted men charged with offenses falling within the jurisdiction of an inferior court in respect to the punishment which may be awarded upon conviction. When but one officer is present with a command the law requires that he shall constitute the court, and shall hear and finally determine such cases as are properly referable to it for trial.

As its name implies, the procedure of this court is summary in character. Cases are brought to trial within twenty-four hours after the arrest of the accused, or as soon thereafter as practicable, and the court sits at hours fixed by the post commander in appropriate orders or, in the absence of such orders, at the convenience of the court. The officer constituting the court is not sworn, but performs his duty under the sanction of his oath of office. The accused appears before the court and, as the right of challenge does not exist, is arraigned in the usual manner. If his plea be guilty, he is given an opportunity to make a statement and, if he so desires, to introduce testimony in respect to character. If the plea be not guilty, the trial is proceeded with in the usual manner; the witnesses are sworn, but the testimony is not recorded. The accused is given the opportunity to cross-examine the witnesses and to introduce testimony in his defense. The proceedings, finding, and sentence are approved and made operative by the signature of the reviewing authority, which is entered in the book itself, opposite the record of the trial. The commanding officers who are authorized by law to approve the sentences of Summary Courts have power to remit or mitigate the same. When the commanding officer sits as a Summary Court, no formal approval of the sentence is required by law; but he should sign the sentence, in such case in his official capacity as commanding officer, and date his signature.

Arrest and Confinement.—A military prosecution is instituted, in the case of an officer, by a military arrest. This is imposed by the proper commanding officer and requires the officer arrested to confine himself to his quarters or tent. These limits may be extended by proper authority, but a breach of close arrest is a serious offense at military law, involving the dismissal of the offender. In the case of an enlisted man the offender is placed in confinement pending his trial and, with a view to prevent abuses, it is required by law that—

No officer or soldier put in arrest shall be continued in confinement more than eight days, or until such time as a court-martial can be assembled."

Jurisdiction of Military Tribunals.—Courts-martial have power to try military persons only for military offenses, save in time of war, when certain persons who accompany the armies in the field are similarly triable. The punishments which a general court-martial may impose include the capital penalty and are specified in the Articles of War; the power of the inferior courts to punish is restricted to three months' imprisonment, with or without forfeiture of pay, including reduction to the ranks in the case of a non-commissioned officer. The procedure of courts-martial is substantially the same as that of civil courts having criminal jurisdiction. The accused may challenge any members for cause stated, but peremptory challenges are not allowed. The court and judge-advocate are sworn and testimony is received under the usual witnesses' oath. The allegations against the accused are embodied in "charges and specifications" which correspond closely to the indictment and counts at criminal law; upon these the accused is arraigned and may plead to the jurisdiction, in bar of trial or in abatement of the action, and the court may decide any issues so arising; when these pleas have been exhausted, or if none of them be resorted to, a plea to the general issue is made, upon which the case goes to trial on its merits. The rules of evidence are those which regulate the admission of testimony in criminal cases in the courts of the United States. The judge-advocate prosecutes in behalf of the United States and, when the prosecution has rested, the witnesses for the defense are heard and the case is submitted on arguments in which the judge-advocate has the right to begin and close. The court is then closed for deliberation and a finding is reached, as to each separate charge and specification, by a majority vote. An appropriate sentence is then imposed, the majority rule prevailing, except in the case of a capital sentence where a vote of two-thirds is necessary. The record is then forwarded to the officer who convened the court whose province and duty it is to take action upon—approve or disapprove, etc.—the proceedings after the same are terminated and the record has been transmitted to him for such action. This officer is ordinarily the commander who has convened the court. In his absence, however, or where the command has been otherwise changed, his successor in command, or, "the officer commanding for the time being," is invested with the same authority to pass upon the proceedings and order the execution of the sentence in a case of conviction.

In cases, however, of sentences of death or dismissal, imposed in time of peace, and of some death-sentences adjudged in time of war, together with all sentences "respecting general officers," while the convening officer (or his successor) is the *original* reviewing authority, with the same power to approve or disapprove as in other cases, yet, inasmuch as the law prescribes that the sentence shall not be executed without the confirmation of the President, the latter becomes in these cases the *final* reviewing officer, and the sentence, having been approved by the officer who convened the court, the record is transmitted to him for his action. If, however, the proceedings or sentence are disapproved by the original reviewing officer, the record is not transmitted to the President,

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as there is nothing left in such case for the action of higher authority. Where a general court-martial is convened directly by the President as commander-in-chief, he is of course both the original and final reviewing authority. The authority of a military commander as reviewing officer is limited to taking action upon the proceedings and sentence by approving or disapproving the same, wholly or in part, and directing the execution of the sentence, and to the incidental function, of pardoning or mitigating the punishments which have been approved by him. Action not included within these powers he is not authorized to take. The power to remit or mitigate sentences awarded by military tribunals is conferred, in express terms by statute, which provides that "every officer who is authorized to order a general court-martial shall have power to pardon or mitigate any punishment adjudged by it except the punishment of death or of dismissal of an officer. Every officer commanding a regiment or garrison in which a regimental garrison or summary court-martial may be held shall have power to pardon or mitigate any punishment which such court may adjudge.

BRIG.-GEN. GEORGE B. DAVIS,
Judge Advocate-General U. S. Army.

Law of Family, The. The term family is one of extensive import and great flexibility. It may embrace an indefinite number of persons, as those who are related by blood, or who are descended from a common ancestor; or it may mean those who reside under the same roof, as members of the one household. It has no technical meaning, in law; and, as a distinct entity, apart from the members of which it is composed, a family is not the subject of legal cognizance; and, even in respect of the management of the family and the natural and domestic relation of its members to each other, there are many things which, in the interest of society, the law holds sacred, and which public policy will not permit a court of justice to inquire into.

On the contrary, there are individual rights, duties and obligations, due from the members of the family to each other, arising from the social and contractual relations between them, which the law recognizes and enforces; and the collective term, being one of constant use in the framing of statutes, contracts, wills and other written instruments, requiring judicial interpretation and construction, it has long since acquired and now possesses a distinct though not a technical meaning, in law. Hence, for the purposes of determining the personal and individual rights of its members, and in order to arrive at a proper determination of the legal effect of the term, when used in such written instruments, it has become a word of considerable legal importance. This importance, however, arises not so much from the necessity of ascertaining the rights, duties and obligations of the family as a whole as it does from the necessity of determining those duties and obligations which its members, as individuals, owe to each other or which arise from the use of the collective term to designate the members of a class of persons instead of the individuals composing that class.

In contemplation of law, therefore, a family is defined to be a collective body of persons,

who form one household, existing under one head and one domestic government, including parents, children and servants, and sometimes boarders and lodgers; and, being a collective body, composed of many individuals, a family may consist of a man's household, including his wife, children or servants; or, it may be composed of his children, without a wife; or, in the absence of children, it may consist of his brothers and sisters, or next of kin, and, upon his decease may even include his heirs. Hence, it is not necessary, to constitute a family, that its head should be a father or mother, for brothers and sisters living together, without parents, may constitute a family, or, a family may consist of a widow, a widower, a bachelor, or a guardian in charge of a minor child, with their servants. In short, every collective body of persons, living together, within the same curtilage, subsisting in common, directing its attention to a common object—the promotion of its mutual interest and social happiness—and which lives with its head, as a part of the household, each member of which is dependent upon him for support, in whole, or in part, constitutes a legal family; and a separate dwelling is not necessary to complete the family, for many families may dwell under the same roof. But, since the law, in its relation to the family, operates only upon its members individually, and not upon the collective unit, as a whole, the subject is referable to the law of domestic relations, in its several branches of husband and wife, parent and child, master and servant and of boarders and lodgers, and, to those rules of construction which the courts have adopted, for the interpretation of those written instruments in which the term occurs; and, therefore, an intelligent understanding of the subject requires a consideration of each of these several branches of the law.

The relation of husband and wife, and parent and child, is based upon natural and moral law. (See LAW OF HUSBAND AND WIFE, THE.) It is the result of marriage alone; and marriage, being a "status, the result of a contract," is a civil institution, and needs none of the elements of a contract, for its support. While the relation of marriage, however, is thus primarily founded upon a contract which implies the mutual consent of the parties, when the contract is once entered into, the relation or status of marriage supersedes the contract through which it is brought about, and, when once established, it can neither be canceled, nor altered, by the voluntary consent or will of the parties, upon any new consideration, for it then becomes a civil institution or status, subject alone to the control of the public will and policy, and the rights, duties and obligations incident to the marital relation spring from, and are, thenceforth, governed by the laws of the State, and cannot be dissolved, except by the public consent, or, in the enforcement of some paramount rule of public policy, justifying a partial or absolute divorce. Being, thus, a civil institution or status, based upon natural and moral law, the relation of husband and wife and parent and child involves, in the highest degree, the natural principles of protection and dependence. From this doctrine, and from it alone, comes the rule that the husband and father is the head of the family, and, as such, has the legal

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right to regulate and control the household; and, in the exercise of this right, he may restrain his wife from squandering his estate, and may preserve his honor, by restraining her from keeping lewd or improper company; he has the right to the custody of his wife and children, and to the services of his wife, during coverture, and of his children, during minority, and, being the head of the family, he has the right to fix its domicil, and it is the duty of the wife and children to dwell with him there. Commensurate with these rights of husband and father, the wife is entitled to his support, affection, society and protection, and the law recognizes his natural and moral duty to maintain, protect and educate his children, and though this duty was unenforceable, by the courts, at the common law, it may now be enforced, in a proper case, under statutory provisions, generally, made for that purpose.

The husband's duty to maintain his wife, and to support and educate his children, is always in proportion to his situation and condition in life; and the duty of a father to provide for the maintenance and education of his children is independent of his obligation to provide for their mother, and is not affected by her misconduct.

Only menial or domestic servants who reside within the master's household are members of his family; and the relation, between them and the master, is purely conventional, arising alone from the contract of employment. By this contract, the servant is bound to render service to the master, in return for which he obligates himself to pay a stipulated compensation; and it is an implied condition of every contract of hiring that the servant shall yield obedience to the lawful and reasonable orders, commands and rules established by the master, for the conduct of his household. The servant is, therefore, to this extent, entirely under the control and direction of the master, and owes him respectful and decorous treatment. However, a servant is not bound to obey the master's unlawful and unreasonable orders, and, while the master has the right to use moderate correction, in the case of an apprentice, he has no right to inflict corporal punishment upon a servant, whether he be a minor or not, to enforce obedience to his commands, or for negligence or insolent behavior.

The servant being a part of the household the master is bound to provide him or her with board, and, where there is nothing, in the contract to the contrary, the servant's right to board continues, even during periods of sickness; but, in the absence of contract, the master is not bound to provide medical attendance to the servant, when taken sick in his service, nor when injured, while acting in the performance of his duties. The master owes the servant the further duty to use reasonable care to protect him from harm, while in the performance of his service, by furnishing him a safe place to work, as well as suitable instruments with which this work is to be done; and, for the master's neglect in these respects, he is liable for injuries occasioned thereby. But, whatever may be the servant's right to recover for breach of the contract of employment, the master cannot be compelled, by decree, order

or judgment of court, to retain him in his employ.

A lodger is one who rests, or dwells in a place, for a time, and lodging implies a temporary habitation. The difference, therefore, between a lodger and a tenant is, that while the tenant has exclusive possession of his habitation, the lodger has merely the use of it, without actual or exclusive possession, which remains in the lessor, subject to the use. The relation between a lodger and the family of which he forms a part, is, like that of master and servant, based upon contract, and is subject to its terms; and, it is a general rule, applicable to all such contracts, that when the owner of a house takes a person to reside in a part of it, though such person is entitled to the exclusive possession of the rooms, appointed for his use, with the uncontrolled right of ingress and egress, yet, if the owner retains his character, as master of the house, the person so occupying a part of it occupies it as a lodger only, subject to the master's control. A lodger may be a boarder, but the two terms are by no means convertible because a boarder may not dwell within the family of which he forms a part.

This, in brief, is the constitution of a legal family, with a naked outline of the legal principles governing the rights and duties of its members; but, inasmuch as the general term family is one of frequent and constant recurrence, in statutes, contracts, wills and other instruments, in writing, its legal importance becomes apparent, in connection with the construction and interpretation of such documents, and, for this reason, some brief reference to this branch of the subject is necessary to its clear elucidation and understanding.

Under the homestead and exemption laws, the term family includes a household composed of parents and children, and other relatives, or domestics and servants; and since, in order to constitute a family, there must be an obligation, upon the part of its head, to support the others, or some of them, and a corresponding state of dependence, on the part of those thus entitled to support, something more is necessary, under these laws, to constitute a family, than a mere aggregation of individuals, residing within the same house; and, while some courts have held that a homestead is "one or more persons actually occupying a homestead," others hold that a single man, or a widower having no persons living with him, other than his servants, is not the head of a family entitled to the benefits of the homestead laws. And, so, while under some exemption laws it is held that a widow, without minor children, occupying a portion of her deceased husband's house, and renting out the farm, upon which it stands, and even a deserted wife, without children, constituted a family; under others it is held that a single man does not constitute a family, although he maintains a household, and has servants and employees to care for it.

Within the purview of a statute providing for the organization of benevolent societies, to secure death-benefits to the "family or heirs" of its members, it is held that where a member was an old man, living, with a young woman, to whom he was not married, but who had lived with him in the same house for many years,

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and who had treated each other as father and daughter, constituted a family, under the statute, and that she was entitled to receive the benefit, upon his death. And, under statutes, subjecting the wife's property to liability for family expenses, it is held that the term "family" includes those who were living with her, as part of her household, including servants necessarily employed in the family, and constituting a part of it. So, where a statute provides an allowance, for the support of "a widow and her family" from the estate of her deceased husband, for a certain time, after his death, the term "family" is held to include, not only the widow and minor children, but also such persons as constituted the family at the time of his decease, whether servants, or children who had reached their majority; and also, a childless widow, and the children of the decedent's wife, by a former husband, if they were under age, and resided with her, are embraced within the term; but, under these laws, the term "family" does not include assistants, who may be necessary to keep the house and manage a farm, or boarders; and a boarder is not within a statute requiring or permitting service of process upon a member of the family of the person to be served. And, under a statute providing that upon the death of a man, having a family, and leaving a widow and minor child, certain property should not be deemed assets, but should be set apart for the widow, it was held that one who had not lived with his wife, for a number of years, and who, at the time of his death, was not keeping house, and had neither servants nor minor children, but had a daughter living with his wife, had a family, within the meaning of the statute.

In applying judicial rules of construction to the interpretation of contracts, where the collective term family, to designate a class of persons, instead of its members, is used, it is held that where a policy of beneficial insurance provides that, where the benefit is made payable to a class of persons, designated as the "family" or "heirs" of a member, the word "family" means next of kin, or those who would take in case of intestacy; and that the terms of a policy of fire insurance, which requires that "a family should live in the house during the whole year," are fully complied with where two servants are left to work about the place during the absence of the assured and his family. So, a transportation ticket issued by a railroad company, for the use of "the holder and his family," is held to enure to the benefit of an adult son living with his father as a member of the family, unless there be some restriction as to the meaning of the term, contained in the contract itself.

Upon the construction of a deed reserving, to the grantor "and his family," an old burying-ground, with a right of way thereto, it was held that a reservation, to his family, embraced not only the grantor's children, who were members of his household when the deed was made, but also, his heirs or lineal descendants generally.

It is a well recognized principle of law that a family in its collective capacity can have no heirs, and, at common law, bequests to a family were void for uncertainty; but, inasmuch as the modern rule of interpretation is to construe the provisions of a will so as to carry out, as near as may be, the intention of the

testator, the effect of this principle is now obviated, by construing the will liberally, in order to give effect to the testator's intention, and, to prevent, where possible, a forfeiture of property. (See WILL.) Thus, where a testator bequeaths property, in trust, the income of which is to be applied to his children and their "families," the word family is held to include his sons and daughters and their children, so long as they live together and form a portion of the same household, or, from their tender years, are entitled to support, as such. So, in a will providing for a reversion of property to the testator's "family," the term family is held to mean his widow and child, and, generally, the use of this term, in a will, is construed to include the testator's wife, as well as his children, if there be nothing in the context to show a different intention; but where the will is that of a deceased wife, the husband is not considered a member of her family, because he is neither next of kin nor heir to his wife; and, where it is the husband's will which is the subject of construction, the word family does not necessarily include a stepson, although it has been held that where a testator directs his trustees to maintain his "son, or his family," the use of the general term includes the son's widow and her children, by him, as well as a child by a former marriage; and, a power given by will, to the testator's widow, to dispose of property for the benefit of herself and "family," authorizes her to execute the power, in favor of an illegitimate son of one of the testator's children.

And, if a power in a will be given, for the benefit of a married woman and her family, the husband would be excluded from participation in its benefits, unless the words used be controlled or influenced by some expression showing a different intent; and, where a testator made a bequest to his son "for the support of himself and family, and for no other purpose," it is held that the will created a trust fund, for the use specified, and the son was not entitled to the bequest, in his own right.

In general, where in devises of real property, and in bequests of personality, the testator uses the word family to describe a class of persons, without other limitation, it may be safely concluded that the word family, so used, will be interpreted to mean "heirs," in respect of realty, and "next of kin" in respect of personal property, and the property, so devised or bequeathed, will, therefore, go to those who are entitled to take, as in case of intestacy, under the laws of descent and distribution.

Bibliography.—For reasons stated in the text, there is no distinctive treatise on the "law of family"; but the subject is briefly referred to in law dictionaries and encyclopedias under that title. However, for its consideration, in detail, reference must be had to works treating of the family relations generally, or of the various subjects into which it has been divided, by jurists and text writers, and to treatises upon the construction of statutes and other legal documents. As to these general and special subjects, reference is made to the following, viz.: Bouvier, 'Law Dictionary,' tit. "Family"; 'American and English Encyclopedia of Law,' tit. "Family"; Schouler, 'Domestic Relations' (5th ed. 1895);

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Browne, 'Domestic Relations' (1883); Reeves, 'Domestic Relations' (1888); Rodgers, 'Domestic Relations' (1899); Tiffany, 'Persons and Domestic Relations' (1890); Ewell and Mure, 'Manual of the Law of Domestic Relations' (1890); Schouler, 'Husband and Wife' (1882); Stewart, 'Husband and Wife' (1884); Hochheimer, 'Custody of Infants' (1899); Tyler, 'Infancy and Coverture' (1882); Wood, 'Master and Servant' (1896); Bailey, 'Law of Master's Liability for Injuries to Servant' (1894).

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Law of Husband and Wife, The. In those communities where the system of monogamy prevails, the law of husband and wife is based upon marriage (q.v.), between one man and one woman, and is to be found in the provision made, by the law-making power, for the regulation and enforcement of the rights, duties and obligations arising from the relation thus established between them. And, in those jurisdictions in which the principles of Anglo-Saxon jurisprudence maintain, the law of husband and wife is embodied in the doctrines of the common law of England, as modified by the application of the principles of equity to the property rights of the wife, and by statutory charges affecting, in this and in other respects, the personal rights and duties of either the husband or the wife.

In its legal aspect, marriage is a status, the result of a contract; but, when the relation of marriage is once entered into, the contract, through which it is brought about, ceases to exist, and thenceforth the relation of husband and wife is governed alone by the laws of the State in which it exists, and it cannot afterward be modified or changed by the voluntary consent of the parties, nor can it be dissolved upon any new consideration, in so far as they are concerned. This can only be done by some action upon the part of the State, for reasons which may be considered sufficient to meet the demands of an enlightened public policy, or which may conserve the general welfare of the State.

The institution of marriage "has its foundation in nature," and is said to be "the parent and not the child of civil society";* and, being based upon natural law, involves, in the highest degree, principles of dependence and protection.

It was a principle of the common law that, upon marriage, the husband and wife became one person, inasmuch as the legal existence of the wife was absorbed or merged into that of the husband; and, while the legal identity of the husband was, in no wise, affected by the marriage, that of the wife was wholly suspended during coverture; and, under this principle, the

husband's dominion over the person and property of the wife became paramount during the continuance of the marital relation between them. For this reason, the wife was wholly incapable of entering into any contract, or of acquiring, conveying or encumbering real estate, in her own right, or of disposing of personal property, by gift or otherwise, without the husband's consent; nor could she sue or be sued alone. Indeed, she was rendered wholly incapable of doing any act *sui juris*, though she might act in any capacity which did not involve a question of her own status, and which was not inconsistent with her legal disabilities as a married woman. She was, therefore, enabled to act as the agent or trustee of another; but, being wholly incapable of entering into contracts in her own behalf, she had no power to appoint an agent to act for herself—not even her husband—and, when acting as trustee, the husband's consent and concurrence was necessary, because he was personally responsible for any breach which might have been committed in the execution of the trust of which she was the trustee.

To the legal disabilities of the wife, however, there were certain exceptions; and, even at the common law she had the right to act, as a feme sole, in case of necessity, or when she was absolved from the disabilities of coverture, by certain local customs. Thus, the wife had the right to act, as an unmarried woman, where the husband was an alien, or where he had been banished or transported for life, or, where he had abjured the realm, or, where he had been imprisoned as a felon; and, by the well-known custom of London, she was enabled to transact business, in her own name, in which her "husband meddleth nothing," and she was chargeable, under this custom, "as a feme sole, concerning anything that toucheth her craft."

Growing out of, and incidental to the marital relation, the common law imposed certain duties and conferred certain rights upon the husband and wife, the performance and enjoyment of which could not be avoided, unless under exceptional circumstances. Among these duties, the husband was bound to support and protect the wife, though there was no reciprocal duty upon the part of the wife to support the husband, except to the extent of her services; she was bound to "honor, love and obey" him, and allow him matrimonial intercourse and cohabitation, and both were entitled to the society and protection of the other; the husband, being the head of the wife, was entitled to the custody of her person, and the control of her property and services; he had the right to fix the marital domicil, and it was her duty to dwell with him there.

Collateral to the doctrine of the merger of the legal existence of the wife into that of the husband, all ante-nuptial contracts, between the husband and wife, were rendered void by the marriage, and, during coverture, they were incapable of entering into any contract with each other; and, upon the same ground, neither the husband nor the wife were liable for torts committed, by the one, against the other. However, the wife's ante-nuptial contracts and torts, with, and against third persons, were in no wise affected by the marriage, the

* This natural origin of marriage is generally recognized by the jurists of England and America; but the doctrine is by no means of universal application. For, when the revision of the laws of France was under discussion, by the Council of State, under the first Napoleon, that reformer is credited with having expressed the opinion, that, "*Le mariage ne dérive point de la nature. La famille orientale diffère entièrement de la famille occidentale. L'homme est le ministre de la nature, et la société vient s'entrer sur elle. Les lois sont faites pour les mœurs et les mœurs varient.*" Upon another occasion, the same authority is said to have maintained, that, "*Si l'homme ne vieillissait pas, je ne lui voudrais pas de femme.*"

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husband being liable for their payment and satisfaction, even though he obtained no property from her, by the marriage; and, if he died, or, for any other reason, the coverture ceased, the obligation and liability of the wife for her ante-nuptial contracts and torts, in favor of third persons, were not extinguished, but were still enforceable against her, upon the termination of the marriage. Upon the other hand, for torts committed against the wife, by third persons, other than the husband, a right of action arose in her favor, although an action could not be maintained by her for their enforcement, without joining the husband in the suit; and damages, if any, recovered, collected and reduced to possession, by the husband during coverture, became the property of the husband, by virtue of his marital rights, and were subject to the payment of his debts, and went to his personal representative, upon his death.

Upon the common law doctrine that the husband was entitled to the *consortium* of the wife, he was entitled to maintain an action, against third persons, for the recovery of damages, for any act which interfered with this right, and, therefore, an action arose in his favor for the alienation of his wife's affections, even though the wrongdoers were the parents of the wife, although an action for the same cause was denied to the wife; the reason assigned for this denial being that the wife was incapable of maintaining an action for the enforcement of the right, without joining the husband, as a party plaintiff, and since any judgment, in an action for tort in her favor would have enured to his individual benefit, it was considered to be against public policy to allow the recovery of damages, in his own favor, for an injury which he himself had caused; but, since this objection applied only to the remedy, and not to the right, the principle upon which the action was based was held to apply to the wife as well as to the husband; and this being recognized, the right of action continued in the wife but was held in abeyance until the disabilities of marriage were removed by death, or otherwise, when it was enforceable by her, as a *feme sole*. Ordinarily, neither the husband nor the wife could be held liable for crime committed by the one against the other; but, to this rule there were certain exceptions, such as assault, manslaughter, and other crimes of an aggravated character, where the interest of the public, requiring the punishment of criminals overbalanced the mere private interests of the individuals, incident to the marital relation.

The liability of the husband or the wife for crimes, committed by either of them, against third persons, was in no wise affected by the marital relation, though, if the crime, complained of, were committed by the wife, in the presence of the husband, the *prima facie* presumption was that she acted under his coercion, and, in such case, the husband was liable, and not the wife. This presumption, however, was subject to rebuttal, and where it was overcome, by the circumstances attending the commission of the crime, she was liable, and not the husband.

The husband's natural duty to support the wife, as recognized at the common law, required him to supply her with all the necessaries

requisite and suitable for her maintenance, commensurate with his social position and condition in life; and this duty necessarily extended to supplies furnished to her, for her children's support, as well as for her own. If the husband failed to perform his duty in this respect, the wife was entitled to use his credit to obtain such necessities and supplies; and for this purpose, her authority to bind the husband was complete, and, being based upon a duty incident to the marital relation, and not upon contract, this authority existed, in favor of the wife, independent of the doctrine of agency, to which it has been generally ascribed.

The full performance of the husband's duty to support the wife was only excused by an abandonment upon her part, without cause; or, as the result of a divorce *a vinculo*, or, where there was a separation by mutual consent, upon a stipulation that he would make a suitable allowance for her support, which is regularly paid by him; and the husband was not relieved from the performance of this duty in case he turned the wife out of doors, or deserted her without cause, and failed to supply her with the means of support.

In consideration of the liability of the husband for the wife's ante-nuptial debts and torts, and of his duty to support her, according to his social position and condition in life, the common law vested in him, *jure mariti*, the ownership, enjoyment and control of her entire estate, real and personal, subject only to certain limitations growing out of the nature of the property which she owned, and its condition, at the date of the marriage. Under the operation of this doctrine, the husband became the absolute owner of all the personal property of the wife, in possession, whether acquired before or after marriage; and no act, upon her part, was necessary to vest the title to such personal property in him. He was also entitled to her choses in action, subject only to the condition, that in order to vest the title in him, they were required to be reduced to the husband's possession, during coverture, and this he was entitled to, without her consent; but the mere custody of a chose in action was not, in itself, such a reduction to possession, as to entitle him to its ownership; hence, in order to reduce the wife's choses in action to possession, some affirmative act, upon his part, was necessary to show an intention to acquire title in himself. If the husband failed to reduce the wife's choses in action to possession, however, during coverture, her title to such property continued unimpaired; he was entitled to the income therefrom, but her ownership and right of possession continued, and survived the coverture, and, upon the dissolution of the marital relation, she was entitled to its enjoyment, as though she had never been married. The husband's right to the real estate of the wife extended only to its use, and the enjoyment of its rents, issues and profits, during the marriage. Hence, he had no right, without her consent, to encumber her real estate, nor to change her realty into personalty, or to do any other act, the effect of which was to change the course of descent, or the right of succession to her heirs.

Besides these rights and interests of the husband in the wife's property, he was also entitled

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to courtesy in her real estate, which became vested in him, upon her death, provided always, that issue was born of the marriage, and, as an offset to the husband's right of courtesy, the wife was entitled to dower in his real estate, regardless of whether issue was born of the marriage or not. This right of dower, it may be observed, was the only interest which the wife acquired in the husband's property, real or personal, by virtue of the marital relation; her right to any part of his personal property, whether before or after his demise, being entirely a matter of statutory enactment.*

The wife's property thus acquired, by the husband, in virtue of the marital relation, became the absolute property of the husband; he could alienate and dispose of it, and it became subject to the payment of his debts, as any other property, belonging to him.

While the natural rights and duties of the husband and wife, growing out of the marital relation, have always been respected and upheld in equity, courts of chancery, in England and America, have never recognized nor adopted the principles of the common law, respecting her property; and, in recent years, these principles have been materially changed, by statute, in both countries; and the tendency of modern legislation is to wholly emancipate the wife's property from the husband's ownership and control, and in this respect, at least, to treat her as a *feme sole*.

Thus, the common law rule, that ante-nuptial contracts between husband and wife were avoided by marriage, was so far modified in equity as to uphold and enforce settlements made, by the husband, for the benefit of the wife, where such settlements were made in consideration of the marriage; and, the same is true of provisions made by him, either before or after marriage, for the personal comfort and adornment of the wife, in the nature of *pin-money* and *paraphernalia*, or, where gifts of property were made, by third persons, for the separate use of the wife; and, courts of equity, in recognition of the wife's right to the acquisition and enjoyment of property in her own right, have even gone so far as to uphold gifts of real estate made, by the husband to the

wife, through the intervention of a third person. Courts of chancery have also recognized and enforced the wife's equity to a settlement in property which she owned, at the date of the marriage, where it was necessary for the husband, or his creditors or assignees, to invoke the aid of these courts, to reduce it to possession; or, where the husband married a ward of the court, without its consent; the maxim in the one case being that he who seeks equity must do equity, while in the other the settlement was compelled, as a punishment to the husband, for his contempt of court, in marrying a ward without the chancellor's consent.

The wife's equitable right to a settlement was the same, whether the property in question were legal or equitable in its nature. This equity to a settlement was, however, a personal right, which the wife alone could enforce, and being an allowance, made out of her own property, for her benefit and for the benefit of her children, might be waived by her, or entirely defeated, if she had a suitable provision otherwise made for her and their support; and the wife's right to a settlement was likewise barred by her fraud or misconduct.

This equitable right of the wife was enforceable, by actions brought and maintained directly in her own behalf, or, in actions brought by creditors or assignees of the husband in order to subject her property to the payment of his debts, or the acquirement of its possession, under an assignment from him. Although these rights of a married woman were fully recognized and enforced in equity, still she had no right to maintain or defend an action, in her own name, for their enforcement, the rule requiring that the husband should be joined, with her, in the suit, or, if his interests were adverse to hers, she came or was brought into court, as complainant or defendant, by or in the name of a next friend.

Aside from these equitable principles recognizing, and to this extent, enforcing the property rights of married women, the common law doctrine of the merger of the legal existence of the wife into that of the husband, and her right to hold and enjoy property, in her own right, has been materially modified, and in some jurisdictions entirely abrogated, by statute, and a married woman now stands, in respect of her separate property, generally, as though she were a *feme sole*; and, where, by statute, she is enabled to hold property in her own right, she may make any contract concerning its management and disposition, as though she had never been married. In some jurisdictions also the husband is wholly released from his common law liability to answer for the ante-nuptial contracts and debts of the wife, while in others, this liability is restricted to the value of the property which he acquires through the marriage, and generally he is released from all responsibility for her post-nuptial torts, unless committed, by his authority, direction or encouragement. So, the common law disability of the wife to acquire property has been generally removed by statute, and she may now acquire property, real or personal, by gift, bequest or devise, directly from the husband, or, from third persons; and, having the authority to acquire and hold such property, she has the right to convey it, without the husband's

(*) Under the civil law, the natural duties and obligations of the husband and wife are much the same, as they were at the common law; the husband is bound to protect and support the wife, according to his means and condition in life, while the wife owes the husband obedience; and, without his consent, she is incapable of acting in law. If, however, she engaged in business, as a sole trader she could bind herself, in any thing relating to her trade, without his consent. As regards property, however, the principles of the two systems, are, in many respects, different. Under the civil law, the wife's property is divided into dotal, or that which the wife brings to the husband, upon marriage, to assist in maintaining the common ménage, and extra-dotal, or that which forms no part of her dowry; and, extra-dotal property includes partnership or community property, *s. i.* such property as is acquired during the coverture, by the joint efforts and labors of both. In the wife's dotal property the husband has no interest except the enjoyment of its usufruct, while in the extra-dotal, or community property, both have a joint interest during life, the undivided moiety of which goes to the survivor, upon the death of either. Both the husband and the wife are enabled, under the civil law, to enter into contract respecting their separate property, in any way, not incompatible with good morals, or which is not in derogation of the husband's authority over the wife and his children, or which does not change the legal order of succession. *Vide Kent's Comm., Vol. II., pp. 183-187, and notes.*

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consent, and, his joinder in conveyances of real estate, is only necessary to bar his right of courtesy, for the same reason that the wife was always required to join in the husband's deed in order to avoid her claim to dower in his lands.

When the wife is empowered, by statute, to acquire, hold and dispose of property, in her own right, she may enter into contracts for its management, protection and improvement, and for the enforcement of such contracts, she may sue and be sued as a *feme sole*; and the right of the wife to maintain actions, in her own name, is not necessarily restricted to actions respecting her separate property, but this right is now extended by statute, in many States, so as to include the maintenance of actions for personal wrongs and other injuries; and for these she may maintain actions, in her own name against the husband, as well as against others, without joining the husband, or suing in the name of a next friend.

The statutory emancipation of the wife, and her property, from the management and control of the husband, however, is not necessarily in all cases complete, and, being in derogation of the common law, the statute under which the right, whatever it be, is claimed, is to be construed strictly, and the right will not be upheld, unless expressly granted, or unless it arises, by necessary implication, from the terms of the statute under which it is sought to be enforced.

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Law of Nations. See INTERNATIONAL LAW.

Law, Patent. See PATENTS, THE LAWS OF.

Law, Physical. See PHYSICS.

Law Schools. The first American law school was founded at Litchfield, Conn., in 1784 and discontinued in 1833. Though not connected with any university it seems to have made an excellent record. Of 1,023 graduates, 50 became members of congress, 15 United States senators, 40 judges of the higher State courts, 10 governors of States, 5 cabinet officers, 2 justices of the Federal Supreme Court, 1 vice-president of the United States and several foreign ministers. A course of lectures in law was delivered in the College of Philadelphia in 1791 by James Wilson, who had been appointed professor of law in that institution, but his work was discontinued before the close of the second course. In 1797 James Kent made a similar attempt at Columbia, but he gave only one course

of lectures. The Harvard Law School, established in 1817, was the earliest school in the country connected with a university and authorized to confer degrees in law. The course was lengthened to three years in 1877. There were no examinations for the degree till 1871, and none for admission till 1877. At the beginning of the year 1897 the rule came into force by which only graduates of approved colleges and persons qualified to enter the senior class of Harvard College are admitted as regular students. The Yale Law School was established in 1824, that of the University of Virginia in 1825, and the Cincinnati Law School in 1833. Law schools had exercised little influence on the legal profession in this country up to the time of the opening of the Columbia Law School in 1858. In 1878 there were 50 schools with 3,012 students; in 1901 there were 86 schools with 11,883 students. The increase in students in 23 years has been 294 per cent. See also EDUCATION, PROFESSIONAL, IN AMERICA.

Lawes, lāz, Henry, English composer: b. Dinton, Warwickshire, 1596; d. London 21 Oct. 1662. He was a brother of William Lawes (q.v.) and was educated as a classical musician. He became famous as a composer for masques and songs and he is eulogized by Milton in several poems. He set to music the poet's 'Masque of Comus' and supervised its production at Ludlow Castle in 1634. He published: 'Ayres and Dialogues, for One, Two and Three Voices' (1653).

Lawes, Sir John Bennett, English chemist: b. Rothamsted, Hertfordshire, 28 Dec. 1814; d. there 31 Aug. 1900. He was educated at Eton and at Oxford, whence he went to London, and there remained for a while engaged in the practical study of chemistry. Reaching his majority, he came into possession of his estate, where he undertook experiments in agricultural chemistry in the interest of a more scientific method of agriculture. In 1843 he employed Dr. (afterward Sir) J. H. Gilbert as superintendent of laboratory work at the Rothamsted farm, and uniting his own labors with those of his colleague, by a course of investigations, indoors and out, developed scientific processes whereby superphosphate of lime came to be used as a fertilizer. For over 50 years they carried on these labors together, and important practical results for improved agriculture are recorded to their credit. In 1899 Lawes transferred his laboratories and experimental fields, with an endowment amounting to about £100,000, to a board of trustees, in order to secure their permanent usefulness. Accounts of the Rothamsted experiments may be found in the 'Journal' of the Royal Agricultural Society of England; 'Reports' of the British Association for the Advancement of Science, 'Proceedings' and 'Transactions' of the Royal Society of London, 'Journal' of the Horticultural Society of London, 'Memoranda' of the Rothamsted station.

Lawes, William, English composer: d. Chester, England, 1645. He was an elder brother of Henry Lawes (q.v.), with whom he was associated in various musical matters, and not only wrote music for many of the songs of the time, but the music for Sandys' version of the Psalms, published in 1648.

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Lawless, Emily, Irish novelist, daughter of the 3d Baron Cloncurry: 1845. She has published several popular romances of Irish life, full of pathos and picturesqueness, among which are: 'A Millionaire's Cousin,' 'Hurrish: a Study' (1886); 'Grania,' her most powerful work (1892); and 'Maelcho,' a story of the rebellion of Sir James Fitzmaurice in the 16th century (1894). She is also the author of 'Ireland,' in the 'Story of the Nations' series (1890); 'A Garden Diary' (1901); 'With the Wild Geese,' poems (1902).

Lawley, Alethea Jane Wiel, English historical writer, 2d daughter of the 2d Baron Wenlock. She was married to Cavaliere Tatteo Wiel in 1890 and lives in Italy. She has published 'Vittoria Colonna,' a study (1888); 'Venice,' 'Story of the Nations' series (1894); 'The Romance of the House of Savoy' (1898); 'Verona,' in 'Mediæval Towns' series (1902); etc.

Lawn, finely woven white goods, cotton or linen, of an open texture; plain or printed. The white sleeves, which form a part of the dress of a bishop in the English Church, are made of lawn.

Lawn-tennis, a modern game, played on grass, gravel, cinder, or asphalt courts, with balls and rackets. The face of the racket is now invariably plane, and consists of a net formed of tightly-strung gut. The balls are of rubber covered with white flannel, about $2\frac{1}{2}$ inches in diameter, and 2 ounces in weight. For a game between two players (a single-handed game) the court is 78 feet long by 27 wide. It is divided across the middle by a net, the ends of which are attached to two posts, which stand three feet outside the court on each side. The height of the net is $3\frac{1}{2}$ feet at the posts and 3 feet at the centre. At each end of the court, parallel to the net and 39 feet from it, are drawn the base-lines, the extremities of which are connected by the side-lines. Half-way between the side-lines, and parallel to them, is drawn the half-court line, dividing the space on either side of the net into two equal parts called the right and left courts. On either side of the net, at a distance of 21 feet from it, and parallel to it, are drawn the service-lines. The players take up their positions on opposite sides of the net, and one of them, decided by tossing, called the server, standing with one foot behind and one foot on the base-line, serves the ball from his right court into the diagonally opposite court. The ball is served by being struck with the face of the racket while it is in the air, and the stroke is counted a fault if the service be from the wrong court, or if the server do not stand as directed, or if the ball do not strike the ground in the diagonally opposite court within the service-line. After a fault, the server must serve again from the same court, unless the stroke was a fault because served from the wrong court. The next service comes from the left court, and thereafter the courts are taken alternately. The non-server is called the striker-out, and it is his business to return the ball by striking it with the face of his racket. The server wins a stroke if the striker-out "volley the service," that is, strike the ball before it touches the ground, or fail to return the service or the ball in-play, or return the ser-

vice or the ball in-play so that it drop outside any of the lines which bound his opponent's court, or otherwise lose a stroke in accordance with the recognized laws of the game. The striker-out wins a stroke if the server serve two consecutive faults, or fail to return the ball in-play, or return the ball in-play so that it drop outside any of the lines which bound his opponent's court, or otherwise lose a stroke. On either player winning his first stroke the score is called 15 for that player; on either player winning his second stroke the score is called 30 for him; on either winning his third stroke his score is called 40; and the fourth stroke won by either player is scored game for that player. However, if both players have won three strokes, the score is called deuce; and the next stroke won by either player is scored advantage for that player. If the same player win the following stroke, he wins the game; but if he lose the next stroke, the score is again called deuce; and so on until one player win two strokes immediately following the score at deuce. The player who first wins six games wins a set, but with both at five a method of scoring similar to advantage is often introduced. Sides are changed at the end of every set. Three-handed and four-handed lawn-tennis differ in no essentials from the game as above described. The game of lawn-tennis as now known was introduced about 1875.

Lawns: Their Preparation and Care, a closely-mown turf maintained for ornament in parks and private grounds. It may or may not be dotted with trees, shrubs, or other specimen plants, or even with flower beds. These are, however, mere incidents, and since they usually detract from the natural beauties of an open sward, should usually be confined to the borders in irregular, rather than formal, order. The lawn thus becomes the canvas and the side-planting the frame for a natural picture in which the dwelling or other prominent feature is placed.

Whether the contour of the surface be level, convex, or concave, it should always be graded so as to avoid even slight irregularities, and where the land is rolling all three contours should be harmoniously blended so as to avoid breaks such as terraces, and so as to ensure the repose that comes from such blending. Except on sand and clay, lawns do well on practically all soils if properly prepared and maintained. After the grading, the land should be plowed, dug, or forked, as deeply as the soil will permit, even to the depth of two feet, then harrowed thoroughly, removing all stones and burning all rubbish, weeds, etc. A liberal dressing of complete fertilizer containing potash, phosphoric acid and nitrogen in readily available forms should be given, and where possible a covering of an inch or more of rich soil is often of decided advantage. Except for their containing seeds of weeds, animal manures are especially valuable, that of sheep and cattle being usually better than ordinary stable-manure; when the latter is applied it should always be after thorough composting and rotting to destroy weed-seeds. The surface being very smooth, the fertilizer well harrowed in and the wind asleep, seeding may be performed, preferably just before rain. The seed should be the purest that can be obtained, and may or may not be raked in, but the land

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should always be heavily rolled. In the Northern States the popular grasses for lawns are Kentucky bluegrass, which is especially valuable for soils rich in lime, red-top and Rhode Island bent-grass. (See GRASSES.) Mixtures of several grasses are valuable because the grasses that start first choke out weeds and are later themselves choked out by the slower-growing blue-grass.

When the grass is three inches tall it should be cut with a scythe, and afterward with a lawnmower as occasion may require. In the autumn a dressing of well-composted manure should be given, and in the spring the strawy useless parts should be raked off before growth starts. After the frost is out of the ground the lawn should be rolled to compact the turf, which usually heaves more or less during the winter. It is further essential that weeding be performed every year, but especially during the first, second and third. If desired, a sprinkling of white clover (*Trifolium repens*) may be given by sowing the seed after or before the grass seed; being of different weights, they cannot be sown together. White clover may also be sown upon heavy and poor soils, where it will often make a good stand and a good precursor for grass. In the South, the grasses mentioned usually fail, and should be replaced by species that can withstand the climatic conditions. The most satisfactory and popular are Bermuda grass, joint grass, and St. Augustine grass. The first is usually propagated by passing the roots, freed from soil, through a feed cutter, sowing and harrowing the pieces.

Small lawns are frequently made by transplanting sod from old pastures, in which cases the turf is cut in long strips about 15 inches wide, rolled up and laid down like carpet, and then pounded or heavily rolled to press the roots firmly against the soil. The subsequent management should be that given seed-sown lawns. Owing to the dryness of the summers in many parts of the United States, lawns are often considered failures. Too frequently, however, these results follow imperfect preparation and improper management. As a rule lawns should not be watered while they are young or in the early part of the season, because this tends to keep the roots near the surface and to make the grasses less able to withstand dry weather. Water should therefore be withheld until the plants seem to be in dire need, and then it should be applied in what may seem excessive quantities.

M. G. KAINS,
Crop Expert.

Lawrence, lär'ëns, Abbott, American manufacturer and diplomatist: b. Groton, Mass., 16 Dec. 1792; d. Boston 18 Aug. 1855. In 1814 he became one of the firm of A. and A. Lawrence, which for many years conducted a prosperous business in the sale of foreign cotton and woolen goods on commission, and later established a cotton industry in Lowell, Mass., with his brother Amos (q.v.). He was a member of the 24th Congress, and again 1839-40. He was a commissioner in 1842 to settle the Northeastern Boundary question and arranged a basis for settlement with Lord Ashburton which was satisfactory to both the United States and England, and was minister to Great Britain in 1849-52; founded the Lawrence Scientific School of Harvard University, to which he gave \$100,000.

Lawrence, Amos, American merchant: b. Groton, Mass., 1786; d. Boston 31 Dec. 1852. He was educated in his birthplace at an academy founded by his father. He worked for many years as a clerk and in 1807 started at Boston a dry-goods business of his own, formed a partnership with his brother (1814), and began a large wholesale business. Lawrence and Lowell became the centres of this firm's manufacturing activity which soon placed them at the head of the cotton-spinning and weaving trade. Amos Lawrence retired from active business in 1831 through ill health, and spent much of his later years in promoting works of philanthropy and patriotism. The academy at Groton, of which he was a liberal benefactor, was named Lawrence Academy in his honor (1843); he contributed liberally to the raising of the Bunker Hill monument, and made large contributions to Williams College. Consult 'Extracts from the Diary and Correspondence of Amos Lawrence with a Brief Account of Some Incidents in His Life' (1855).

Lawrence, George Alfred, English novelist: b. Braxted, Essex, 25 March 1827; d. Edinburgh, Scotland, 23 Sept. 1876. He was educated at Oxford, studied law, but soon turned his attention to fiction and became suddenly famous by his novel 'Guy Livingstone, or Thorough' (1857). He was much read in America as well as in his own country, and 'Sword and Gown' (1859); 'Breaking a Butterfly' (1869); and his other fiction increased his popularity for the time, though he is now little read.

Lawrence, George Newbold, American ornithologist: b. New York 20 Oct. 1806. He was privately educated, was for some years in the drug business, but in 1867 retired, and thereafter devoted himself to ornithology. From 1846 he contributed to the literature of ornithology; and he also made an extensive and valuable collection of birds, including 8,000 specimens representing almost every variety found in the United States, and an excellent series of the birds of Mexico, Central America, the West Indies, and South America. This collection he sold to the American Museum of Natural History. He assisted Baird and Cassin in the preparation of 'The Birds of North America' (1866).

Lawrence, James, American naval officer: b. Burlington, N. J., 1 Oct. 1781; d. 5 June 1813. He entered the navy as a midshipman 4 Sept. 1798; in 1800 was made acting lieutenant, and in April, 1802, lieutenant, and served during the war with Tripoli; he was first lieutenant of the schooner Enterprise, and one of the party which boarded and destroyed the frigate Philadelphia in the harbor of Tripoli on the night of 15 Feb. 1804. Shortly before peace was concluded he was given command of a gunboat, and on his return to the United States, served as first lieutenant of the Chesapeake, and subsequently commanded the Vixen, the Wasp, and the Argus. In November 1810 he was promoted to the rank of master commandant, and given command of the Hornet. In 1812 he cruised in the Hornet with Commodore Bainbridge's squadron along the South American coast and at the mouth of the Demara River he met the British brig Peacock, which after a severe action of about 15 minutes he forced to sur-

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render. When she surrendered, the Peacock was badly damaged and sinking, and Lawrence transferred the crew to his own ship. (See HORNET.) On 14 March 1813 he was promoted to the rank of captain and appointed to the frigate Chesapeake, then lying in Boston; the Hornet was also placed under his orders, and it was intended that the two ships should sail against the Greenland whale fishery. On 1 June 1813, when the Chesapeake was ready for sea, Lawrence sailed out of the harbor to meet the British ship Shannon; after a severe battle he was forced to surrender, and his ship was taken as a prize into Halifax. (See CHESAPEAKE AND SHANNON, BATTLE OF.) Lawrence was fatally wounded and died four days after the battle; throughout the action he showed the greatest coolness and courage, and his last words as he was carried from the deck were, "Don't give up the ship."

Lawrence, John, American statesman and judge: b. Cornwall, England, 1750; d. New York 1810. He emigrated to America in 1767, settled in New York, was admitted to the bar in 1772, and soon established himself in successful practice. An active patriot at the outbreak of the Revolution, he served in the army throughout the war, and on the termination of hostilities returned to New York, where for many years he was engaged in a large and lucrative professional practice. He was a member of the State senate, when in 1789 he was elected the first representative from New York city in the first United States Congress. He was a zealous and able defender of the measures of Washington, and on measures relating to the public credit and the national currency, to the neutrality of the United States as regards European belligerents, to indiscriminative foreign commerce, and to the promotion and security of all our commercial interests, spoke with eminent comprehensiveness and foresight. He represented the city of New York in the second Congress, and in 1794 was appointed by President Washington judge of the United States court for the New York district. He accepted this office at the particular solicitation of the bar, in consequence of his knowledge of admiralty law and the increasing number of admiralty cases. He resigned it in 1796 upon being elected to the United States Senate, of which body he was for a time president. He supported the measures of President Adams, upon whose retirement he resigned his seat and withdrew to private life.

Lawrence, Sir Thomas, English portrait-painter: b. Bristol 4 May 1769; d. 7 Jan. 1830. His father was an innkeeper, and the artist very early exhibited proofs of his talent for the art; he is said to have sketched portraits very successfully in his fifth year. At the age of six he was sent to school, where he remained two years; and this, with the exception of a few lessons subsequently in Latin and French, constituted his whole education. Young Lawrence, however, had access to the galleries of some of the neighboring gentry, in which he employed himself in copying historical and other pieces, and at the age of ten he had full employment as a painter of portraits in crayons. In 1787 the family removed to London, and Lawrence was admitted a student at the Royal Academy. His

subsequent career was successful and brilliant. He was elected in 1791 a Supplemental Associate by the desire of the king, being under the age (24) fixed by the laws of the institution. No other case of the kind has occurred. On the death of Sir J. Reynolds the next year he was made painter to the king. His reputation grew steadily, and he was soon considered the first portrait-painter of the age in England. His scene from the 'Tempest' was a successful attempt at historical painting. In 1794 he was made a Royal Academician. In 1815 he was knighted by the Prince Regent, who also employed him to take the likenesses of the allied sovereigns and the most distinguished persons of their suite. During their visit to England he finished the portrait of the King of Prussia, and went to Aix-la-Chapelle several years afterward to paint the Emperor Alexander; thence he went to Vienna, where he completed the portraits of the emperor, the archdukes, Metternich, etc., and in Rome painted Pius VII. and Cardinal Gonsalvi. These portraits are now in the Waterloo Gallery at Windsor, and are of great historical value. On his return to England he was elected president of the Royal Academy, as successor to West. This office he held till his death. His portraits are striking likenesses, and display a bold and free pencil; but they are, particularly his later ones, chargeable with mannerism, and are not considered to be successful in expressing the nicer shades of character. His income for the last 20 years of his life was very large, but he died poor, owing to the lavishness with which he spent money in acquiring the first-rate productions of his art, in assisting less fortunate artists, and in other ways. His valuable and unrivaled collection of drawings by the old masters was unfortunately dispersed after his death.

Lawrence, Sir William, an eminent surgeon and anatomist: b. Cirencester 16 July 1783; d. 5 July 1867. He received his early education at a private school, and in 1799 was apprenticed to the celebrated Abernethy, and was an inmate of his house for five years. In the third year of his apprenticeship he had given such proofs of his zeal and capacity that Abernethy appointed him demonstrator in anatomy at Saint Bartholomew's, and for 12 years he discharged the duties of his office with signal ability. In 1824 he became principal surgeon to Saint Bartholomew's Hospital, the office of surgeon to which he had filled from 1813. Within two years from this date he had discharged successively the duties of surgeon to the Eye Infirmary in Moorfields, and surgeon to the Royal Hospitals of Bridewell and Bethlehem. In 1816 he published an 'Introduction to Comparative Anatomy and Physiology,' and in 1819, 'Lectures on the Physiology, Zoology, and Natural History of Man,' which provoked the hostile criticism of theologians. In 1829 he succeeded Abernethy as lecturer on surgery to Saint Bartholomew's, and altogether he was connected with this hospital 65 years. Shortly before his death he was made a baronet. Few men of his time did more than he for the advancement of surgery. His treatise on 'Hernia' was a standard work, and that on 'Diseases of the Eye' (1833) marks an epoch in ophthalmic surgery. His lectures on surgery were published in 1863. He was twice president of

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the Royal College of Surgeons, and on two occasions he delivered the Hunterian oration.

Lawrence, William, American politician; b. Mount Pleasant, Ohio, 29 June 1819; d. 8 May 1899. He was graduated at Franklin College (1838) and at the Cincinnati Law School (1840). He early became prominent in politics, and from 1845 to 1847 owned and conducted the 'Logan County Gazette,' and was afterward editor of the 'Western Law Journal.' He served in the lower house of the State legislature, and for five years as State senator, and from 1857 to 1864 was judge of the court of common pleas, and of the district court. After seeing some military service (1862), he was elected to Congress in 1865, and in 1880 appointed first Comptroller of the United States Treasury, from which office he retired in 1885. He has published several books on law, notably, 'The Law of Claims against the Government' (1875); and 'The Treaty Question' (1871).

Lawrence, William, American Protestant Episcopal bishop; b. Boston 30 May 1850. He was graduated at Harvard in 1871, and at the Episcopal Theological School, Cambridge, Mass., in 1875; was rector of Grace Church, Lawrence, Mass., 1876-84; professor of homiletics and pastoral theology at the Theological School above named, 1884-93; dean of the school, 1888-93. He was university preacher at Harvard, 1888-91. In October 1893 he was elected bishop of Massachusetts, to succeed Bishop Brooks, and was consecrated to that office, which he continues to hold, in the following year. He has published a 'Life of Amos A. Lawrence,' his father (1889); 'Visions and Service' (1896); 'Life of Roger Wolcott,' and other works.

Laurence, William Beach, American jurist; b. New York 23 Oct. 1800; d. there 26 March 1881. He was graduated at Columbia College in 1818, and after his admission to the bar in 1823 he practised in New York, where he attained eminence. He removed to Newport, R. I., in 1850; was elected lieutenant-governor of Rhode Island in 1851, and soon after became acting governor. He became widely known by reason of his connection with the "Circassian case" in 1873, before the American and British International Court in Washington, D. C., his arguments securing the case for his clients and leading to the only reversal of a decision by the United States Supreme Court that had ever occurred. He published 'History of the Negotiations in Reference to the Eastern and Northeastern Boundaries of the United States' (1841); 'Belligerent and Sovereign Rights as Regards Neutrals During the War of Secession' (1873); 'Disabilities of American Women Married Abroad' (1871); 'Administration of Equity Jurisprudence' (1874); etc.

Lawrence, Kan., city and county-seat of Douglas County, on both sides of the Kansas River, and on the Atchison, T. & S. Fe and the Union Pacific R.R.'s; 40 miles west of Kansas City. It is the farming trade centre for Douglas and parts of two other counties; and is principally engaged in manufacturing, which is greatly promoted by the excellent water power furnished by the river. It is the seat of the Kansas State University, Haskell Institute, and Government Indian Industrial School; contains a hospital, public library, and several public parks;

and has flour and paper mills, barbed-wire, ice, shirt, sash and door factories, and foundry and machine shops. There are electric light plants, waterworks, several National and State banks, daily, weekly and monthly periodicals, and an assessed property valuation of over \$1,000,000. The city was settled by an anti-slavery colony from the East in 1854 and was named in honor of Amos A. Lawrence. It was the first of the Kansas Free-State towns founded by the Emigrant Aid Society, soon after the passage of the Kansas-Nebraska Bill (q.v.). In 1856 a band of Missouri border ruffians sacked the town, which was defended by old John Brown (q.v.) and his sons. In 1863, the Confederate raider Quantrell attacked the town and killed 125 citizens. Pop. (1890) 9,900; (1900) 10,862.

Lawrence, Mass., city, and one of the county-seats of Essex County, on both sides of the Merrimac River, and on the Boston & Maine railroad, 26 miles northwest of Boston. It is one of the notable and leading manufacturing cities in the valley of Merrimac River, a stream fed mainly by the network of small rivers, brooks and storage lakes, rising in or lying at high levels, among the mountains and highlands of New Hampshire. Built at the lowermost available rapid upon the river, the city has the concentrated power of all the tributaries of that stream and receives benefit from the entire watershed feeding the main current—an area of 4,450 square miles. The water power developed at this point, amounting to about 15,000 horse-power, is remarkably uniform and reliable.

Water Power Plant.—In 1845-8 the "Great Stone Dam," located at Bodwell's Falls, near the old historic "Andover Bridge," was built of hammered granite. When finished this structure was considered the most complete and durable work of the kind then existing in America. It was bedded upon the underlying strata of blue stone or Merrimac schist, and was so thoroughly constructed that it has stood to this day without alteration or addition, seemingly a part of the ledges between and upon which it was built. This dam concentrated at one point, the power of three successive natural river rapids, the accomplished result being a fall of 26 feet, increased in height, when needful, by flashboards, to 30 feet. The overfall of water is in one unbroken sheet over a crest, nearly straight in line, 900 feet in length between the granite abutments. In addition to this unbroken span of solid stonework the protecting wings of the dam are 729 feet in combined length. There are two main canals, one along the northern bank of the river, one mile in length, and another upon the southern side, one half mile long; these distribute water power to the large mills and workshops. Steam power is also used in addition, by nearly all manufacturers, and, in some instances, it is exclusively relied upon.

Manufacturing and Business.—Lawrence may well be known to Americans as "The Worsted City," for the United States census of 1900 shows that, in the production of worsted and woolen dress goods, Lawrence leads in New England: the sum invested in that distinct business being \$29,854,901, and the value of goods produced annually \$25,584,744. Compared with the producing centres of the entire country, Lawrence leads in the amount of capital invested in any one locality in the worsted and

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woolen dress goods industry, and in the value of that class of goods produced it is exceeded only by Philadelphia. It has been estimated by experts that the wool clip from about 12,000,000 sheep is used annually in the worsted and woolen mills of the city. Among wool growers and dealers of the world, the city is known as a leading consumer of that staple.

The three great manufacturing companies that lead in importance are Pacific Mills, having 5,600 people engaged in producing calicoes, lawns, delaines, serges, and other worsted dress goods, the American Woolen Company's Washington Mills, employing over 6,500 operatives in the making of worsted and woolen goods for men's wear, and Arlington Mills with nearly 5,000 people employed in the manufacture of ladies' worsted dress goods, worsted yarns, mercerized cotton yarns and "Worsted Tops" as specialties. The many other concerns producing textile fabrics are thriving and important. The making of book, news, cartridge and calendered papers is an established industry of much importance, and paper mill machinery is constructed on quite an extensive scale by enterprising companies and firms. The making of shoes is carried on to a limited extent.

Site and Environment.—The site was peculiarly adapted in its character and surrounding to the building up of an important industrial centre. The small Spicket River here enters the Merrimac from the north and the winding, shaded Shawsheen stream enters from the south. The location is healthful—a rolling plain flanked by low protecting hills. The topography of the site favored economical development. The rapid Merrimac River divides the city into nearly equal sections; the northern half has come to most importance and has the largest population and most important industrial establishments. The city was laid out in 1845-6 by the founders and promoters, and has been built largely in accordance with original plans. The principal streets make a slight angle at a turn in the river and are arranged to intersect with great regularity.

Public Works and Buildings.—The public works were liberally planned and thoroughly built. The waterworks, established in 1874-5, were so ample, in all the main features of the system adopted, that extensions have not made it necessary to reconstruct the pumping plant or the storage reservoirs. The source of water supply is the Merrimac River. The filtration beds that cleanse the current before it is distributed for use, were designed by an eminent sanitary engineer and constructed, in 1892, under the care and approval of the Massachusetts State Board of Health. The system was successful and has attracted the attention of the scientific in our own and foreign countries. Similar or modified plans have since been extensively adopted elsewhere. The experimental station of the Massachusetts State Board of Health, where important experiments in sanitation are constantly tried and tested by experts, is established here. Illuminating and heating gas and electric lighting and power are supplied by a single chartered company that well serves the public needs. The new court-house, erected in 1903, costing about \$250,000, is architecturally beautiful in design and commodious and complete in furnishing and outfit. A new post-office or United States government build-

ing, costing \$150,000, is in process of erection. No more commodious school buildings can be found in any city of the same population and class. The old city hall—the original "Town House," served, for a quarter century, almost every conceivable public use and is still a noticeable structure, answering the purpose for which it was erected.

Parks and Pleasure Grounds.—The founders of the city wisely reserved a common, of 17 acres, at the very centre of the business and residence section, as a public pleasure ground. No buildings are allowed upon this central park and no public reserve in the commonwealth is more nobly wooded or more truly the people's ground. About this central park the largest public buildings, the leading Protestant churches and many of the best residences are grouped. Four large outlying parks, in a nearly wild condition, but of much natural beauty, and several smaller squares are well cared for by an established park commission of five members. A playstead of several acres, exclusively for games and athletic exhibitions, is conveniently located.

Banks and Savings Institutions.—Five national banks have become established and are of undoubted stability. The three savings banks have deposits amounting to \$15,000,000, largely the savings of working people.

Churches and Charities.—There are 40 organized churches in the community, the Roman Catholics having much greater numbers and larger value in property than any one denomination and nearly equaling the other sects combined. There is an organized city mission. A General Emergency Hospital and Children's Home are maintained by the Ladies' Union Charitable Society, a Protectory or Asylum for orphans or destitute children, an endowed Home for Aged People, and every nationality in the community has its own relief, benefit, or social societies.

Government, Schools, Free Libraries and Lectures.—Municipal control is in the hands of a mayor, six aldermen, and 18 councilmen, all elected annually. The number of wards (six) and the number of government members has not changed since the first acceptance of the original charter. There are 30 organized public schools, the high school having 700 pupils housed in a new, elegant and commodious building recently erected at a cost of \$250,000. The lower grades are accommodated in houses of modern construction and furnishing. Evening schools are maintained as a part of the public school system and give to workers of every age and nationality a chance to advance in classical or English studies and also give special instruction in penmanship, mechanical and freehand drawing, bookkeeping and the natural sciences. A free course of lectures especially for industrial classes, upon scientific and miscellaneous subjects, has for many years been sustained by endowment. The free public library of over 50,000 volumes is patronized by all classes. The main library building was the gift of a generous citizen.

History.—Previous to 1845 the territory now included within city limits (about seven square miles lying in form nearly a square) was an unimportant section of two old, historic towns—Andover and Methuen. The inhabitants of the site numbered only about 350 souls and were nearly all the families of quiet farmers or river-

LAWRENCE—LAWSON

men; there was not a church building, warehouse for trade, or manufacturing establishment of any importance then standing in the entire district. In 1845-6 an associated company of manufacturers, financiers and merchants, the leading pioneer manufacturers and progressive business men of prominence in Massachusetts, after critical examination becoming satisfied regarding the rare value of the water power and, recognizing the peculiar fitness of the site for a manufacturing city, associated themselves together and procured an act of incorporation under the name of the Essex Company, chartered for the purpose of developing and controlling the water power and establishing factories and workshops at or near the site they selected. This company purchased lands covering nearly half the area of the contemplated town and secured land or flowage rights for several miles above the site chosen for the projected city. These associated founders and promoters decided to locate at the lowermost of three successive Merrimac River rapids below Lowell, at the confluence of the Merrimac, Spicket and Shawsheen rivers. Promoted, as the Lawrence building and manufacturing enterprise was, at the outset, by responsible and powerful sponsors, the "New City," as it was at first called, rapidly developed and became almost at the beginning important as an industrial centre. In less than two years from the commencement of operations in 1845, the settlement was organized as a separate town, taking the name of Lawrence in honor of the eminent merchant manufacturers of that name who were so deeply interested in establishing the town and city.

The city has had its calamities. Its industrial enterprises survived the financial reverses of 1857-8-9, only because of powerful support given by loyal defenders and business leaders. This time of trial was succeeded by the gloom attendant upon the "Fall of Pemberton Mill," 10 Jan. 1860, an occurrence that enlisted the interest and sympathy of the entire country. In the War of the Rebellion the city's volunteers were among the first to respond to the call for troops and were among the first to engage in conflict. A citizen, Sumner H. Needham, was the first martyr to fall in the ranks of the patriot soldiery in April 1861.

Local Characteristics.—The cosmopolitan character of the population is particularly noticeable. Forty-five per cent of the people were born in foreign lands and only about 25 per cent of the number are of full native parentage. The greatest immigration has been from Ireland, the British Isles, Germany, Canada, and considerable numbers from every nation of continental Europe and from some Oriental countries. Pop. (1900) 62,559; (1904 est.) 68,000.

ROBERT H. TEWKSBURY,
President of the Lawrence Savings Bank.

Lawrence, The, Commodore Oliver Hazard Perry's flagship at the Battle of Lake Erie in the War of 1812.

Lawrence, Saint, Gulf of. See SAINT LAWRENCE GULF.

Lawrence Scientific School, The, a part of Harvard University, Cambridge, Mass.; founded by Abbott Lawrence in 1847. The primary object of the institution was to afford an opportunity for special study and training in science

which the then existing foundations and departments of the university did not offer. Not the least of the important benefits it conferred during the earlier years of its existence was the bringing of Prof. Louis Agassiz into close relations with the university, a special chair of zoology and geology in the scientific school having been created for him by Mr. Lawrence in 1848. It was originally intended that the Lawrence Scientific School should be independent of Harvard College, and for many years it was so maintained, but in recent years it has gradually become merged with it until it now forms a part of the university, its government together with that of the college and the graduate school being under the faculty of arts and sciences. The courses offered include civil engineering, electrical engineering, mechanical engineering, mining and metallurgy, architecture, chemistry, geology, biology, general science, science for teachers, and anatomy and physiology. So far as possible the instruction relates rather to the principles of science than to technical work, the intention being to make the graduates ready for the apprenticeship of their professions. See HARVARD UNIVERSITY.

Lawrence University, Appleton, Wis., a Methodist Episcopal institution founded in 1847, and named in honor of its principal donor, Amos A. Lawrence, of Boston. In 1902 it had 34 professors and instructors, 600 students, 16,964 volumes in the library, and productive funds, \$205,020; grounds and buildings valued at \$210,000; benefactions, \$7,000; income, \$28,000.

Lawrenceburg, lá'rēns-bérg, Ind., city and county-seat of Dearborn County, on the Ohio River, and on the B. & O. and the C. C. C. & St. L. R.R.'s, 22 miles west of Cincinnati, Ohio. It was settled in 1817 and was first incorporated in 1847. The government is administered by a mayor, elected every four years, and by a city council, elected every two years. It has manufactures of flour, edge-tools, burial caskets, tubewell supplies, whiskey, wagons, barrels, etc. Pop. (1890) 4,284; (1900) 4,326.

Lawrenceville (lá'rēns vil) **School, The**, an American college preparatory school at Lawrenceville, N. J., originally founded in 1810 but refounded in 1882 as an endowed school known as the "Lawrenceville School on the John C. Green Foundation," at which time the English "home system" was adopted. In scope it corresponds to such English schools as Harrow or Rugby, and now contains about 400 pupils, with some 32 masters. There are 11 master's houses, with an Upper House and the Hamill House for the boys of the upper form, managed by boards of directors appointed by the boys themselves. There are five forms, each corresponding to one year's work. In addition to the buildings already named there are a large stone chapel, a spacious building for class-room exercises called Memorial Hall, and an immense gymnasium with swimming-pool, erected in 1902. Lawrenceville itself is a small village five miles northeast from Trenton and about the same distance from Princeton, southwest.

Lawson, Cecil Gordon, English painter: b. Wellington, Shropshire, 3 Dec. 1851; d. London 10 June 1882. He exhibited at the Academy,

LAWSON — LAY

in 1870, but many of his pictures were rejected by the hanging committee till 1878, when his 'Minister's Garden' and a 'Pastoral' at the Grosvenor made him famous. He was highly esteemed by the poet-painter Rossetti, and his works are now much valued. Consult: Gosse, 'Cecil Lawson, A Memoir.'

Lawson, John, American colonial surveyor-general: d. 1712. He was of Scotch birth; began his surveys in 1700, and was an intelligent observer, enterprising and circumspect, but fell a victim to the jealousy of the natives, who confounded the surveyor of their territory with those who despoiled them of it. He was captured by them during one of his explorations when in company with De Graffenreid, a Swiss baron who contemplated colonization. The latter was permitted to buy himself free, but Lawson failed to propitiate their hostility and perished by the fire torture. He left one of the most valuable of the early histories of the Carolinas, of their feeble condition, their resources and aspects, and their principal aboriginal tribes. It is entitled 'A New Voyage to Carolina, containing the Exact Description and Natural History of that Country, together with the Present State thereof; and a Journal of a Thousand Miles Traveled through Several Nations of Indians, giving a Particular Account of their Customs, Manners, etc.' (1709). The volume is a quarto of 258 pages, well illustrated with one of the best maps of the time, and with various other engravings, chiefly in natural history. It is now rare.

Lawson, Victor Fremont, American newspaper publisher: b. Chicago 9 Sept. 1850. He was educated at Phillips Academy, Andover, Mass. He inherited from his father an interest in a printing establishment, and in 1876 bought the Chicago *Daily News*, which, with his partner, he developed successfully, starting a morning edition in 1881 under the name of the *Record*. In 1888 he bought out his partner and became sole proprietor; in 1901 the *Record* was merged with the *Times-Herald*. He has been president of the Associated Press; has also been active in philanthropic work, and started the *Daily News Fresh Air Fund*, which supports a sanitarium for sick children of the poor.

Lawson, Sir Wilfrid, English statesman: b. Cumberland, England, 4 Sept. 1839. He early came into notice as a temperance advocate. In 1859 he was elected to Parliament, and in 1864 introduced a "Bill for the legislative suppression of the liquor traffic." In 1868 he was re-elected to Parliament with Mr. Gladstone's party as member for Carlisle. His local option bill passed in 1880, 1881, and 1883. After serving in Parliament two subsequent sessions he lost his seat in 1900. He is president of the United Kingdom Temperance Alliance.

Lawson's Cypress. See CYPRESS.

Lawton, Henry Ware, American soldier: b. Manhattan, Ohio, 17 March 1843; d. San Mateo, Luzon, 19 Dec. 1899. He entered the military service as a private 16 April 1861; became captain 17 May 1862. He was mustered out 25 Nov. 1865, but entered the regular army as second lieutenant the next year; was transferred to the Fourth cavalry in 1871; and promoted to captain 20 March 1879. In 1876 he was

conspicuous in the expedition against the hostile Sioux, took part against the Ute Indians in Colorado, in October 1879, and in the spring of 1886 was selected by Gen. Miles to lead a picked body of troops into Mexico in pursuit of Geronimo. At the end of three months Geronimo and his band were captured. At the beginning of the Spanish-American War Lawton was a lieutenant-colonel, and was made a major-general of volunteers 8 July 1898. He was in command of the Second Division of the Fifth army corps before Santiago, and at the close of the war was transferred to the Philippines where he began active operations against the insurgents and after capturing Santa Cruz, a Filipino stronghold, 10 April 1899, and San Isidro, 15 May, was placed in command of Manila, 1 June. In the autumn he began an offensive campaign looking toward the capture of Aguinaldo, and was killed in the battle of San Mateo.

Lawton, Okla., city and county-seat of one of three counties formed from the Comanche reservation and added to Oklahoma Territory, 6 Aug. 1901. By the day set for opening the town site to settlers, 25,000 people were encamped close to the town limits, forming a tent frontage of 8 miles. The city is named for Gen. Henry W. Lawton (q.v.), American soldier killed in the Philippines. The entire tract added to Oklahoma is larger than the State of Connecticut and contained within three months from the opening about 50,000 inhabitants. The other county-seats are Anadarko and Hobart.

Lay, Benjamin, British-American philanthropist: b. Colchester, England, 1677; d. Abington, Pa., 1759. His parents were Quakers, and he illustrated in his life the humane principles which the Society of Friends has so long conspicuously represented. At 18 he adopted a sailor's life, and for some years followed the sea. In 1710 he was married and lived again for a while at Colchester; afterward went to Barbados, where he became a merchant; but having aroused hostility by his denunciations of slavery, removed from the island to Philadelphia, where his anti-slavery agitation was continued. Of numerous tracts which he wrote on slavery one was published by Franklin, entitled 'All Slave-Keepers, that Keep the Innocent in Bondage, Apostates.' He was influential in bringing the Friends in this country to take a more decided stand against slave-holding. He did not, however, confine his reforming endeavors to one direction, but labored for a more humane treatment of criminals, and discouraged the eating of animal food, and the using of tea and tobacco. He is described as a singular figure, dwarfish and hunchbacked, and presenting an appearance of poverty. He was buried in the Friends' burying-ground at Abington.

Lay, Henry Champlin, American Protestant Episcopal bishop: b. Richmond, Va., 6 Dec. 1823; d. Easton, Md., 17 Sept. 1885. He was graduated at the University of Virginia, ordained deacon (1846) and priest (1848). He was consecrated missionary bishop of the Southwest (1859) and translated to the diocese of Easton (1869). During the Civil War the Episcopal charge of Kansas was assigned to him, that State being then erected into a diocese. The revision of the lectionary was largely due to Bishop Lay; while he was engaged on the Standard Prayer Book up to his death.

LAY—LAZARETTO

Lay, John Louis, American inventor: b. Buffalo, N. Y., 14 Jan. 1832; d. New York April 1899. In July 1862 he was appointed second assistant engineer in the United States navy, and in 1864 invented a new torpedo. By means of this apparatus Cushing destroyed the Albemarle, a Confederate ram. When Admiral Porter advanced up the James River after the evacuation of Richmond, Lay was employed to clear away the submarine obstructions. He was engaged by the Peruvian government to mine the harbor of Callao, in view of a Spanish attack, but his main work as an engineer and inventor was the construction of the dirigible torpedo, which bears his name and was purchased by the United States Government.

Layamon, lä'yä-mön, or **Laweman**, lä'män, British chronicler. He lived early in the 13th century, and was a priest ministering at Radstone, now known as Areley Regis, on the Severn, in Worcestershire. He is the author of a metrical romance, 'The Brut,' which is mainly an amplified version of the French 'Brut d'Angleterre,' the latter being itself a compilation with additions from Geoffrey of Monmouth's 'Historia Britonum.' As history or literature its value is slight, but it is of high philological importance, and exhibits the English language in its period of transition and before it had become Gallicized, as in the 'Canterbury Tales' of Chaucer. In fact, there are not more than 90 words derived from the French in the whole poem of 56,000 lines. Consult the London Society of Antiquaries' edition of 'Brut,' edited by Sir Frederick Madden (1847).

Layard, lä'ard, Austen Henry, English traveler and archaeologist: b. Paris 5 March 1817; d. London 5 July 1894. He was of a family originally French; was partly educated in Italy; began to study law, but gave up this work and entered upon a course of travels in the East. Before he was 23 he had traveled in most of the larger European countries; in 1840 he was on the banks of the Tigris; and before the end of his career had "won distinction as a traveler, archaeologist, politician, diplomatist, and student of the fine arts." In 1845 he began the excavations in Assyria (q.v.) for which he first became celebrated. The results of his discoveries on the site of Nineveh (q.v.) were published in 1849-53. In 1849 he was appointed attaché to the British embassy at Constantinople. At first he paid his own expenses in his researches, but afterward received generous assistance from Lord Stratford de Redcliffe, then English ambassador in Constantinople; and still later £3,000 voted by the House of Commons was used by the trustees of the British Museum for continuing Layard's excavations. He received from Oxford the degree of D. C. L. In 1852 he entered Parliament as a Liberal, and became under-secretary of state for foreign affairs in 1860. He was lord rector of the University of Aberdeen, 1855-6; in 1860 was again elected to Parliament, and 1861-6 again under-secretary of state for foreign affairs; in 1868 was appointed chief commissioner of works and privy councillor; went to Spain in 1869 as British ambassador; and 1877-80 was ambassador to the Ottoman Porte. In 1878 he received the Order of the Bath, and was made a foreign member of the Institute of France in 1890. He wrote much on the history of painting, was a

leading spirit in the Arundel Society, and a trustee of the National Gallery. His writings include 'Nineveh and Its Remains' (1849); 'Nineveh and Babylon' (1853); 'Monuments of Nineveh' (1849-53); 'Inscriptions in the Cuneiform Character from the Assyrian Monuments' (1851); 'Early Adventures in Persia, Susiana, and Babylon' (1887, 1894). Consult his 'Autobiography' (1902).

Laycock, lä'kôk, Thomas, English physiologist: b. Wetherby, Yorkshire, England, 10 Aug. 1812; d. Edinburgh, Scotland, 21 Sept. 1876. He was the earliest to put forth the theory of the reflex action of the brain. This was in 1844, and in 1855 he became professor of the practice of physic and of clinical medicine at Edinburgh University. He published 'Mind and Brain' (1860); 'Methods of Medical Observation'; etc., and wrote many professional papers on sanitary science, insanity, etc.

Lay'ering, in horticulture, is a mode of propagating plants by bending down a young branch and covering part of it with earth, thus causing it to shoot forth roots before it is separated from the parent stalk. The portion covered with soil has often a notch cut in it below, or a tight ligature is applied. The free return of the sap is thus prevented, and the formation of roots from buds is promoted. The time which must elapse between the cutting or binding of the shoot and its separation from the parent plant varies greatly, a few months sufficing in some cases, while two years are requisite in others. This mode of propagation is employed for pinks, hortensias, heaths, gooseberries, etc.

Laynez, lä'näth, or Lainez, Diego, dë-ä'gö, second general of the Jesuits: b. Almancio, near Siguenza, Castile; d. Rome 19 Jan. 1565. He studied in Alcalá and Paris, in which latter town he joined with Ignatius Loyola in founding the order of Jesuits. His especial work was to travel over Europe to gather new members, and spread the influence of the order, when the constitution of the order had been confirmed and approved by Pope Paul III. 1540. He was very successful in extending the Society of Jesus. He was a man of marked ability and as a consulting theologian took a conspicuous part in the Council of Trent. He had succeeded Loyola as general of the Jesuits in 1556. On the death of Paul IV. he avoided the chance of election to the tiara, and refused a cardinal's hat. Consult Boero, 'Vie du P. Jacques Lainéz' (1894).

Lazaret'to, a name given in Italy, and other parts of southern Europe, and also in Hawaii and in California, to isolated hospitals for such as are afflicted with contagious disorders. The name is derived from Saint Lazarus, who is the patron saint of lepers; and during the Middle Ages, when leprosy was common in Italy and other parts, the hospitals in which the lepers were confined received that name, and the lepers themselves were called lazzari. Howard wrote 'An Account of the Principal Lazarettos in Europe' (1789). Those buildings and enclosures attaching to seaport towns chiefly on the Mediterranean, where the crews and passengers of ships from places where contagious disease is known to prevail, are also called lazarettos. These lazarettos consist generally of various detached buildings, with courts between, the whole being surrounded by a wall, and

LAZARISTS—LAZULI FINCH

placed in an airy situation outside the town, or sometimes on a small island near the coast. See also QUARANTINE.

Laz'arists, or Fathers of St. Lazarus, a congregation of the Roman Catholic Church, originally known as "Priests of the Mission," founded at Paris by St. Vincent de Paul in 1625 for the purpose of supporting missions and ministering to the spiritual wants of the poor at home, and in foreign parts, especially Barbary. The foundation was confirmed by letters-patent of Louis XIII., May 1627, and the missionaries were erected into a congregation by Pope Urban VIII. in 1631. At the time of the Revolution they included 1,195 members and 63 houses. In 1817 they established themselves in the United States.

Lazarus, láz'a-rüs, Emma, American poet: b. New York 22 July 1849; d. there 19 Nov. 1887. Trained at home under the personal direction of her father, Moses Lazarus, a New York merchant of prominence in the social and business world, she early displayed intellectual promise. From her childhood books were her most precious possession and her mind was turned to poetry for its utterance—the Civil War inspiring her first lyric outbursts. Her earliest productions, 'Poems and Translations' (1867), were marked by a seriousness if not sombreness, incomprehensible in one so young, whose life, too, was full of happy anticipations. In her second volume, four years later, there was more artistic completeness, and a certain consciousness of power gave more strength to her verse. Her 'Admetus and Other Poems' (1871) was favorably received, and its classic atmosphere showed distinct talent, while, side by side with its imaginings in 'Admetus' and 'Tannhäuser' were its flashes of personal experience in 'Epochs' and the musical rhapsodies in 'Phantasies.' In 1874 her love for German literature was evidenced in her 'Alide,' a story of Goethe's Sessenheim period, so far as its background is concerned, wherein she has admirably incorporated whole passages from the 'Autobiography' to give naturalness to the episode. It is a charming romance, which won high praise from Tourgeneffs as the work of one who "is not a pupil in art any more" and "is not far from being a master." Her next book printed for private circulation, 'The Spagnoletto' (1876), a five-act tragedy of the 17th century, was remarkable at least for the new note in treatment, its stormy sweep of passion, so unlike the calm, reflective emotion of her precious poems. It was in 1878, when she was giving the finishing touches to translations from Heine, that a new theme was suggested to her—the translation into English of representative Jewish poets of the Spanish school. With enthusiasm she responded to the appeal, and, desiring to reproduce the spirit of the original, studied Hebrew with rare diligence and soon grew independent of German paraphrase. The ease with which she mastered the mediæval Jewish poets and the interest she displayed in Jewish history were preparations for a more important work. A little volume was shown her—"Der Tanz zum Tode" by Reinhard, based on historical data furnished by Franz Delitzsch, as a more elaborate treatment. Her 'The Dance to Death' was the result, for which she was un-

able to find a publisher until it was issued as a serial in a Jewish weekly, and appeared about the time of the Russian Jewish persecution of 1882, although it was written without any reference to those outbreaks. In the American movement to aid the refugees, she took a helpful part. She wrote in 'The Century' (May 1882) an impassioned article, 'Russian Christianity versus Modern Judaism,' wherein she championed her brethren and reputed their critics and assailants. In prose and verse she further strove to vindicate her ancestral creed and inspire its followers to brotherhood and useful activity. In 'The Century' for February 1883 she pleaded for "a restored and independent nationality and repatriation in Palestine." After her father's death in March 1885 her own health failed slowly and the end came in November 1887, just at the time when her powers were ripest and her opportunities seemed at their greatest. In addition to the volumes already named she published 'Poems of Heinrich Heine' (1881); 'Songs of a Semite'; 'The Dance to Death, and Other Poems' (1882). Her collected poems were issued in two volumes in 1889.

A. S. ISAACS,
New York University.

Lazarus, Jacob H., American painter: b. New York 4 Oct. 1822; d. there 11 Jan. 1891. Displaying early in life marked artistic taste, before his manhood he became a pupil of Henry Inman (q.v.), but soon established a studio of his own, and for nearly 50 years was a successful artist. In addition to his ability as portrait painter, he was an admirable critic of art in general. He painted the portraits of many eminent men of his time, among them those of Governors Sewell, Hubbard, English, and Walcott, of Connecticut; Governor Hoffman, of New York; John Van Buren, for the Manhattan Club; Gen. Schuyler, for the city of Philadelphia; Maj.-Gen. Halleck; Dr. Fordyce Barker, for the Academy of Medicine; John Amory Lowell and members of his family, for Harvard University; and the Rev. James Freeman Clarke. A scholarship bearing his name was given to the Metropolitan Museum of Art by his widow and daughter, supported by an endowment fund of \$24,000, the interest of which is awarded annually to the most proficient male pupil in the class of painting organized by the art school of the museum.

Laz'enby, William Paul, American scientific agriculturist: b. Bellona, N. Y., 5 Dec. 1852. He was graduated in agriculture at Cornell (1874) and elected teacher of botany, horticulture and forestry in that institution. He later was appointed on the staff of Ohio State University and for six years held the position of director of the Ohio Agricultural Experiment Station. He belongs to many scientific and agricultural societies, and has done much good service in lecturing before farmers' institutes and other associations. He is at present professor of horticulture and forestry in the Ohio State University, and secretary of the Ohio Medical University.

Laz'uli Finch, a small brilliantly blue finch (*Cyanospiza amara*) of the Western States, frequently kept as a cage-bird. It is much like its relative, the eastern indigo-bird (q.v.).

LAZULITE—LEAD

Laz'ulite, a mineral, which is not to be confused with lapis lazuli (q.v.), is found in Austria, Switzerland, Sweden, Brazil, and in North Carolina and Georgia. It occurs massive, and also well crystallized in monoclinic crystals of steep-pyramidal habit. It has a fine blue color and vitreous lustre, and is semi-translucent. It is moderately hard, but brittle; specific gravity, 3.1. It is a hydrated phosphate of aluminium, iron, and magnesium, but it also contains lime, and sometimes silica.

Lea, lē, Henry Charles, American author: b. Philadelphia 19 Sept. 1825. He entered his father's publishing house in 1843; became its head in 1865; and retired from business in 1880. He has actively engaged in public undertakings for civil and social advancement, and during the Civil War rendered conspicuous services in support of the Federal government. Between 1840 and 1860 he wrote many papers on chemistry and conchology, and after 1857 devoted his attention to European mediæval history. His chief works are: 'Superstition and Force' (1866); 'An Historical Sketch of Sacerdotal Celibacy in the Christian Church' (1867); 'A History of the Inquisition of the Middle Ages' (1888); 'Chapters from the Religious History of Spain' (1890); 'Formulary of the Papal Penitentiary in the Thirteenth Century' (1892); 'A History of Auricular Confession and Indulgences in the Latin Church' (1896); 'The Moriscos of Spain: Their Conversion and Expulsion' (1901). He was a son of Isaac Lea (q.v.).

Lea, Isaac, American naturalist: b. Wilmington, Del., 4 March 1792; d. Philadelphia 7 Dec. 1886. In early life he engaged in commercial pursuits, and from 1821 to 1851 was partner in a large publishing business; but from boyhood he was devoted to the study of natural history, and his various collections of minerals and fossils, and especially of shells, were valuable contributions to science. He was a member of the Academy of Natural Sciences of Philadelphia, and of the Philosophical Society of the same city, in whose 'Transactions' many of his observations were published; he was also elected to membership in learned societies abroad. His work in the study of fresh-water and land mollusks brought him special distinction. His principal publications are: 'Observations on the Genus *Unio*' (1827-33); 'Synopsis of the Family of Naiads' (1852-70). In the National Museum at Washington his vast collection of *Unionidae* and his gem collections are deposited. Consult: Scudder, 'Bulletin U. S. National Museum,' No. 23 (Washington). An account of Lea's work in conchology was published at Philadelphia in 1861 by G. W. Tryon, Jr.

Lea, Matthew Carey, American chemist: b. Philadelphia 1823; d. there 15 March 1897. His work in developing the chemistry of photography has served important purposes. Besides many articles treating of the chemical action of light, his publications include an authoritative 'Manual of Photography.' He was the eldest son of Isaac Lea (q.v.).

Lea'cock, Hamble James, American missionary: b. Cluff's Bay, Barbados, 14 Feb. 1795; d. Sierra Leone, Africa, 20 Aug. 1856. He was

educated at Codrington College, Barbados, took deacon's orders in 1826, and became assistant priest of St. John's parish, where he aroused great opposition by freeing his own slaves and offering to all slaves within the parish the privileges of the Church. Subsequently he was stationed at St. Vincent, and was pastor of St. George's, Charlestown, Nevis, whence he removed in 1835 to Lexington, Ky. From 1836 he held various pastorates, in 1848-55 was again in Barbados, and in 1855 went to Africa as the first volunteer of the West Indian Church Association for the furtherance of the Gospel in West Africa. He developed a large mission field at Rio Pongas, Sierra Leone. Consult the biography by Caswall (1857).

Lead, lēd, S. Dak., city in Lawrence County; on the Chicago & Northwestern and the Burlington & Missouri River R.R.'s; about 18 miles from the western boundary of the State. It was settled in 1876 and incorporated in 1877. It is situated in the Black Hills in a gold mining region. The chief industries are connected with mining, the manufacturing of mining tools and the outfits for mining camps. Some of the largest mines in the vicinity are the Homestake Gold Mining Company, which employs about 5,000 men; the Hidden Fortune Gold Mining Company, employing about 500; and in several other mines about 5,000 more miners are employed. The modern methods of mining have made the Black Hills (1903) the third largest gold producing region in the world, and Lead receives its share of the industrial plants connected with preparing the ore for market. The educational institutions are the public and parish schools, Black Hills Business College, the Hearst Free Kindergarten, and the Hearst Free Library. The Lead Coliseum and several churches are among the prominent buildings. The combined capital of the banks (1903) is \$50,000; and the value of the business transacted annually is about \$17,000,000. The government is vested in a mayor and a council of 10 members, two from each ward. Pop. (1890) 2,581; (1900) 6,210; (1903) 11,000.

JOSEPH FEEENEY,
Secretary Commercial Club.

Lead, one of the useful metallic elements, well known in chemistry and in the arts. From early times references to it are found in literature. It is mentioned in Exodus xv. 10, Numbers xxxi. 22, Job xix. 24, and Ezekiel xxvii. 12, and is supposed to have been imported into Palestine from Tyre, although it should be remembered that there are lead mines in Sinai and the Lebanon, as well as in Egypt. Articles made of lead by the ancient Romans, such as water-pipes, water-tanks, weights, rings, and small ornamental cylinders, are still preserved. Examples in the grounds of old churches show that the Roman method of making pipes from sheet-lead continued in use till late in the Middle Ages. Small lead-weights of curious forms have been found among Viking remains dating as early as the 10th century. Many of the European countries are known to have produced lead as early as from the 10th to the 14th century. The important lead mines of the world are in Europe and the United States.

Chemical Properties.—Lead (chemical symbol Pb, from the Latin name of the element, *plumbum*, atomic weight about 207), is a soft

LEAD

metal of a bluish-white color, tending to gray, with a bright metallic lustre when newly cut or melted. It soon tarnishes when exposed to the air, taking on a thin film supposed to be suboxide. But lead suffers less than most metals either from atmospheric agencies or damp soils. It can be scratched with the nail, and easily cut, and makes a mark upon paper. Its specific gravity varies from 11.352 in the ingot to 11.365 when rolled into sheets, and it melts at about 619° F. (326° C.). It is highly malleable and in a less degree ductile, but its tenacity is small—a wire 1-12th of an inch being unable to carry a load of 20 pounds. Lead is not a good conductor of heat or electricity. When gently heated it can be forced by pressure through perforations, and pipes. Water containing carbonic acid has a slight action on lead, carbonate being formed and dissolved, but this action is apparently hindered by the presence of some salts and accelerated by others. When lead is heated to redness in air it is oxidized, litharge (PbO) being formed. Lead is attacked by nitric acid and by hot strong sulphuric acid, but dilute sulphuric or hydrochloric acids have but little action. It is therefore largely used for the construction of sulphuric acid chambers and for chemical works plants. It alloys readily with many metals.

Lead Oxides.—Five oxides of lead are known, namely, the suboxide (Pb_2O), the monoxide (PbO), the sesquioxide (Pb_2O_3), the red oxide (Pb_2O_4), and the dioxide (PbO_2). Of these, however, only three—the monoxide, the red oxide, and the dioxide—are of any importance. Lead monoxide (PbO), litharge, massicot, is largely used in the arts, and is made by heating molten lead in a shallow reverberatory furnace with free access of air, the litharge as it forms being pushed on one side so as to expose a fresh surface of the metal. The mass thus obtained is ground and separated from intermixed lead. It is then the buff-colored powder known as ground litharge or massicot. When the oxidation takes place above the melting point of the oxide, as in cupellation, the litharge on solidification breaks up into orange-colored scales and is then known as "flake litharge." Litharge melts at about 600° C. to a clear liquid, and at higher temperatures volatilizes. Lead oxide is a powerful base and dissolves in acids forming salts. At high temperatures it combines readily with silica, forming fusible silicates, and therefore has a very corrosive action on crucibles or firebricks which contain silica. An electrolytic process of making red lead and litharge from galena is used at Niagara Falls. When litharge is heated to dull redness with free access of air, oxygen is taken up and the red oxide (Pb_2O_4) red lead is formed. It is manufactured by roasting ground litharge with free access of air for about 24 hours; the operation being carried on till the required tint is obtained on cooling. It is used as a pigment.

Lead Ores.—Until recently only a small quantity of lead was obtained from any other ore than galena (PbS). Galena (q.v.) is found extensively, more or less pure or associated with other ores, in various parts of the United States, in Great Britain, Germany, Spain, and other European countries. The production of lead in the United States has become a very important feature of the world's industries. The

richest ores are found chiefly in the Western States, the carboniferous limestone, bearing both hard and soft ores, which contain silver chloride and cerussite. The output of smelting-works in Colorado, Idaho, Missouri, Montana, Utah, etc., figures largely in the industrial statistics of the country. (See LEAD INDUSTRY, AMERICAN.) At the present time the main supply of lead is obtained from the Rocky Mountain regions, where the ores are argentiferous—as to some extent all galena is—and the lead-silver mines in some of the States mentioned have produced much wealth for their owners. Conde lead is imported into the United States from British Columbia and Mexico. Other minerals associated with galena are anglesite or sulphate of lead, lanarkite, which is a basic sulphate, pyromorphite, or phosphato-chloride of lead, and bournonite, consisting of the sulphides of lead, copper, and antimony. Galena is very heavy and usually can be easily separated from most of the lighter minerals with which it is associated. The heavier minerals, such as barytes, pyrites, and blonde, are not so easily or completely separated. In Great Britain the ore is crushed to pass through about a half-inch sieve, and is dressed to contain over 76 per cent of lead. In other countries the concentration is not so high and sometimes no dressing is resorted to. This is specially the case in districts where the blast-furnace is used for smelting, since finely divided material is unsuited for the blast-furnace.

Metallurgy.—Galena is the principal lead ore employed for the purposes which metallurgy (q.v.) now so widely subserves. The next important ores, the sulphate and the carbonate, are seldom treated except in combination with others. The three main processes are the air-reduction, the roasting and carbon reduction, and the ion or precipitation reduction processes. Galena when taken from the mine is broken up into small pieces or reduced to powder, and the impurities, in so far as these can be removed mechanically, separated by machines. If the dressed galena is nearly pure, as it often is, the smelting operation is simple. The processes of lead-smelting—galena being the ore—which have grown up in various parts of the world, are strikingly similar in principle, though differing much in detail. In the United States lead is smelted in reverberatory furnaces made of brick, or in water-jacketed blast-furnaces. The blast-furnace is always preferable to the reverberatory where it can be used, and has now become almost universal for lead-smelting.

Compounds of Lead.—One of the most important lead compounds is plumbic carbonate (carbonate of lead, white lead). $PbCO_3$ —the cerussite of mineralogists, and now largely mined in the United States as an ore of lead. White lead is manufactured on a large scale, and is extensively used in the arts as a white pigment and as a body for other colors in paints. (See PAINT.) Another leading compound is plumbic chloride (chloride of lead). $PbCl_2$. The minerals matlockite and mendipite are both oxychlorides of lead. A basic chloride of lead is made for use as a white pigment, which is, however, not so serviceable as ordinary white lead. Lead acetate (sugar of lead), $Pb(C_2H_5O_2)_2 \cdot 3H_2O$, is prepared by dissolving massicot in dilute acetic acid. It can be obtained in transparent crystals or in scales by evaporating the

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solution. It is soluble in $1\frac{1}{2}$ parts of cold water, and in eight parts of alcohol. Like litharge, it is used in the manufacture of oil-varnishes. Minium or red lead is much used in the manufacture of flint-glass, as a cement, and as a pigment. For glass-making it requires to be made of very pure lead, as a slight trace of copper would impart a color to the glass. Minium is prepared by heating massicot or monoxide of lead to a temperature of 600° F. in iron trays, in an oven, carefully avoiding fusion. More oxygen is thus gradually absorbed; and a bright-red compound is formed which is the red lead of commerce. Orange lead, made from white lead instead of from massicot, is a very pure kind of red lead. Yellow lead, so called sometimes by manufacturers, is a mixture of the oxides of lead and antimony, which is to some extent used to give a yellow color to earthenware, and as a pigment. The so-called black lead (see GRAPHITE), of which pencils, etc., are made, contains no lead.

Lead in Medicine.—Most of the lead compounds used in medical practice are made into external applications for disorders of the system which manifest themselves upon the skin, although some are employed as sedatives, astringents, etc. Lead acetate is an approved internal remedy in typhoid fever, diarrhoea, and other diseases. Of plasters, ointments, and the like, lead carbonate, lead iodide, and lead oleate are familiar constituents.

Lead Poisoning.—The use of lead in the arts is a frequent cause of painful and sometimes fatal effects, from the metal finding its way into the system. The glazing of culinary vessels with lead; the coloring of confectionery with the chromate, chloride, or carbonate of lead; the sweetening of sour wine by litharge or oxide of lead; the drinking of water which has passed through new lead-pipes; and living much in rooms newly painted with lead-colors, all these things may cause exposure to this peril, and often produce lead or saturnine poisoning. But the most frequent and virulent cases occur among painters and persons engaged in white-lead factories. In lead-poisoning the countenance assumes a sallow, earthy hue, the skin becomes dry and harsh, the digestion is deranged and the bowels constipated, and a sweetish metallic taste is felt in the mouth. A specially important sign is the appearance of a blue or violet line along the margin of the gums and teeth, due to the formation of a sulphite of lead. There is sometimes kidney disease, muscular palsy, severe disturbance of the brain, and even epilepsy and some form of insanity. The most noteworthy result of lead-poisoning is lead-colic, or painter's colic.

S. SANFORD,
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Lead Industry, American. • The use of lead antedates written history, and its abundant occurrence in nature and the ease with which it is reduced from its ores, lead archaeologists to infer, even when little mention and few traces are found, that the ancient nations were familiar with its properties. In Egypt lead was used as an alloy for bronze, and in native form for small images and amulets. The Egyptian slingers used it for sling bullets, as did the Persians. Greece and Rome knew lead as well

as we of to-day. Britain and Spain yielded the Romans thousands of tons. Nearly every land on earth found more or less lead within its borders, and the mining of this metal in a small way was almost universal before the discovery of America. Naturally so base a metal as lead was not the objective treasure of the adventurous miners and metallurgists who first struck their picks into American soil. Gold and silver they sought, and if for many years they found little, their search at least developed many mines and regions, as perhaps the too easy discovery of the yellow metal they coveted might not have done. The first American lead discovered was in 1621, near Jamestown, Va. Iron-smelting works had been erected by the London Company, and an expert metallurgist named John Berkeley was put in charge. Berkeley, in addition to his services rendered to the company, did a little prospecting on his own account, which developed the existence of a vein of galena, the commonest ore of lead. He worked this secretly and supplied his neighbors with lead for bullets and other purposes; but cupidity caused him to keep the location of the vein a secret, so that when, a year or two later, he was killed by Indians, his secret died with him. A few years later a friendly Indian disclosed the location of the old mine, and the lead deposits of Virginia have been worked more or less ever since, although the output has never been very great. Lead was also early discovered in Connecticut and Massachusetts, and by the middle of the last century valuable workings were open in New York State. The lead mines of the East, however, have never been of such importance as those of the great central and western regions of the Upper Mississippi and in Missouri, which were early developed by the French. The lead fields of the Galena district, comprising portions of Iowa, Illinois, and Wisconsin, which have been among the most productive in the world, were probably first discovered and worked by an Indian trader named Nicholas Perrot, who explored from the Canadian settlements of the French as far as the river Des Moines during the last of the 17th century. By 1690 the Indians living in the regions about Galena were smelting and selling lead to the French traders. The region about the present city of Dubuque, which was one of the richest lead districts in America, was also first worked by a Frenchman, Julien Dubuque, who settled among and made friends with the Sacs and Foxes in 1774, just prior to the Revolution. The Indians in 1788 granted to Dubuque the mine he had discovered, known as Prairie du Chien, and in 1796 the grant was confirmed by Baron de Carondelet, the French governor-general of Louisiana. Dubuque worked his mines until his death, in 1809, when the Indians reclaimed them from Dubuque's creditors, and held possession until their removal from the district, in 1832, by the United States government. Dubuque's heirs then claimed the property, but the government ejected them; and legal squabbles kept the status of the district in a most uncertain condition until 1847. The mine La Motte, upon the head waters of the St. Francis River, was also discovered by a Frenchman, the famous adventurer and explorer, M. de la Motte-Cadillac, who founded Detroit. La Motte discovered the celebrated Golden Vein

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sometime between 1715 and 1719. The lead fields near Potosi, Mo., were discovered about 1720 by Philippe François Renault, and in 1763 the extensive fields known as Mine à Burton were discovered by Francis Burton, who in 1798 granted about one third of his claim to Moses Austin. The latter erected improved furnaces for smelting, sunk the first shaft ever seen in a lead mine in that district, and began the manufacture of shot and sheet-lead.

At the birth of the United States, France and Spain, with their respective territories of Louisiana and Florida, had jurisdiction over nearly all the valuable mining lands of the lead region; and even where the United States had acquired rights, the mining privileges were usually in the hands of the French and Indians, who recognized their value and were slow to part with them. The Indians, in particular, made the rich surface sheets of galena a source of continual profit. Their methods of smelting were crude in the extreme, consisting usually of a small hole dug in the ground and lined with rocks. This was usually located on a side-hill, both for the purpose of getting a strong air-draft, and also in order that a small tunnel connecting with the bottom of the furnace-hole might be dug, through which the molten lead could run off when the galena and fuel were thrown in and fired. Rough pigs, run in a hollow of the earth itself, and weighing about 75 pounds, were usually made by the Indian squaws and taken to the trading-posts for barter. This method of smelting was wasteful, but with the practically unlimited supply it made little difference, and almost any man who found either a pocket of the "float" mineral or a small vein could mine and smelt it roughly himself. As the surface deposits became exhausted, and the miners had to go deeper, while at the same time improved and economical methods of reducing the ore became necessary, more capital was required and the works became more extensive. There is probably no ore that reduces more readily than galena, yet at the same time the volatility of the molten lead permits great loss from careless methods. The composition of the ore, which is a sulphide, is about eighty per cent of lead, with more or less silver, and sometimes nickel, cobalt, or antimony, with about seventeen per cent of sulphur. Simple roasting suffices for its reduction, the sulphur combining at a low temperature with the oxygen of the air, and passing off. This is, in its simplest statement, the process by which lead is extracted from this ore; and either open furnaces with strong draft, or reverberatory furnaces, are used. Unfortunately a considerable quantity of the lead passes off in fumes from the furnace. In remedying this, some of the modern smelting-works have found it profitable to build a very long funnel-pipe, through which the fumes from the furnace are passed before they reach the air. During this passage they are cooled, and a very appreciable quantity of lead in the form of powder is deposited along the pipe.

In 1838 cerussite, or lead carbonate, was found by the American miners to be reducible and a valuable ore. This ore, previously thrown away by the miners, who called it "dry bone," was found in large quantities, and its utilization very greatly increased the annual output during the decade following. Under this stimulus, and the litigation over the more important lead re-

gions having been settled, the output of the mines in the Galena district jumped from 664,530 pounds in 1825 to 54,494,856 pounds in 1845. The decade between 1840 and 1850 witnessed the high-water mark of the lead interests in America up to the time that the Western lead fields were opened. The rich properties of the Mississippi and in Missouri yielded plentifully, and in their eagerness the mine owners allowed themselves to glut the market, so that prices fell and the entire lead industry received a set-back from which it was some years in recovering. The Jasper County lead fields, which have built up the town of Joplin, Mo., were discovered in 1848. Operations were carried on in a small way, but no general attention was attracted to this district until a dozen years later, when in three years 17,500 tons were produced from these mines. Since then the annual output has been as great as 17,765 tons, and in one year (1884), the disastrous one for all lead interests, as little as 2,665 tons. American lead mines held a poor third place among the productive fields of the world, however, until well into the 70's, ranking below England and Spain. But the development of the great Western deposits of argentiferous galena, discovered in 1864, changed all this. This rich region, neglected on account of its inaccessibility to a market, suddenly took on life and activity with the extension of the railroads through the territory. In 1877 the Eureka district was turning out nearly 20,000 tons of lead annually; the Utah lead fields, worked by the Mormons, were producing 15,000 tons annually so early as 1873, and by 1877 the output had increased to 27,000 tons for the year. Colorado was a year later in showing respectable results for her workings, but by 1883 the output of the mines of that State amounted to the tremendous total of 70,557 tons. This marvelous increase was largely due to the cerusite deposits at Leadville, which were first worked in 1878, and from which fully one half of the total lead production of the State was derived. These Western lead ores were, almost without exception, very rich in silver. While silver in small quantities is found in all galena, and has been extracted even from the ores of the Mississippi and Missouri lead regions in quantity ranging from 6 to 20 ounces per ton, it was only in the Western mines that the precious metal was found in quantity sufficient to make the lead a by-product so far as relative values were considered. So little was thought of lead, in fact, that in the earlier days, when transportation was more difficult and expensive, the ore was cuped at the mines, and only the silver brought to market. For this reason the lead output was dependent upon the silver market, but this is beginning to change, so that the production of the American mines has been developed to a point far in excess of the figures of 25 years ago. The year following the development of the Western argentiferous deposits the United States was producing as great a quantity as was England in 1872, when she was the great lead miner of the world. Less than ten years later the annual output of the American mines had reached a figure greater than the combined production of England, Spain, and the United States in 1872, and the increase was steadily maintained.

In the foreign commerce of the nation lead has, within the past five years, come to play a

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far more important part than it ever did before. In 1885 the imports of lead and its manufacturers were only \$486,436, and the exports \$123,466. In 1890 the figures had only increased to \$657,658 for the imports and \$182,412 for the exports; but the very next year saw a marvelous advance, which has continued ever since. The importation of silver-bearing ores, containing much lead, has also become an important matter, and until the silver repeal bill was passed, and the "bull" days for that metal ceased, Mexico had a great interest in that direction.

During the years between 1825 and 1899 the production of the lead mines of this country amounted to nearly 5,000,000 tons. The product, as summarized for the same period by the demi-decades, will give, if the previous explanation of causes is borne in mind, the best illustration of conditions, rise, and progress in the lead industry that can be drawn. Up to 1873 lead was almost entirely obtained from the non-argentiferous ores of the Missouri and Mississippi regions; but after 1875 the table specifies the relative quantities from the two grades of ore. The figures given are standard short tons:

PRODUCTION OF LEAD, 1825 TO 1899.

YEAR	Total	Non-Argen-tifero-us Ore	Argentifero-us Ore
1825	.....	1,500	.....
1830	.....	8,000	.....
1835	.....	13,000	.....
1840	.....	17,000	.....
1845	.....	30,000	.....
1850	.....	22,000	.....
1855	.....	15,800	.....
1860	.....	15,600	.....
1865	.....	14,700	.....
1870	.....	17,830	.....
1875	59,640	24,731	34,909
1880	97,825	27,600	70,135
1885	129,412	21,975	107,437
1890	161,754	31,351	130,403
1895	241,882	39,890	201,992
1899	304,392	40,566	263,826

In the production of the 304,392 tons of metallic lead in 1899 the 39 smelting and refining works employed 8,379 men, to whom was paid in wages for the year \$5,088,684. This sum, together with \$144,195,163 paid out for ores, supplies and materials, and other charges incidental to the carrying on of the business, brought the total expenditures for the year above \$150,000.00. The value of product for the census year was \$175,466,304.

Between lead crude, and cast or hammered into some required form, and lead manufactured, chemically changed, and metamorphosed, there is a great break in time. The chief of all the products of lead manufacture is, of course, the carbonate, which was the psmithium of the Greeks, the cerusa of the Romans, and is the white lead of to-day. As a pigment and base for colors it finds its chiefest use, its well-known body and opacity and ready assimilation with linseed-oil, which is the best of all vehicles for coloring-matters, making it the best substance man has yet discovered for this purpose. Other important lead products are litharge, the yellow protoxide; minium or red lead, which is a combination of the protoxide with a peroxide; orange mine or orange mineral, made by heating white lead; and lead acetate or sugar of lead. There are several other forms in which lead combines, but the substances already given are

those of most importance in the arts. In point of antiquity the oxides seem to be older than the white lead, no traces of which are found in the wall-paints of the Egyptians, Hindus, or other ancient peoples; whereas the oxides are found to have been used both for the glazing of pottery and in colors. White lead was first brought into extended use by the Romans; and Rhodes, the manufacturing centre of antiquity, was the place from which the finest was obtained. Roman women used the ceruse as a cosmetic—a use it also found among the Athenian belles; and minium was used as rouge. In these peculiar uses, despite the well-known injurious qualities of lead, the same substances have remained up to a comparatively recent date. White lead was also used by the Romans as a body for their paints, and both it and its manufacture are described by such ancient writers as Theophrastus, about 300 B.C.; Vitruvius, who wrote about 200 years later; and Pliny and Dioscorides, who filled respectively the records of the two succeeding centuries. These writers all agree in stating that white lead was produced by placing sheets of lead in pots with vinegar or wine lees, and allowing them to stand. This fails to account for the presence of the carbon dioxide necessary to the reaction which converts the lead acetate to the carbonate; but it is certain that this substance was present, for the product was unquestionably white lead. During the Dark Ages, and up so far as the 16th century, there was little use for white lead. About the latter date its manufacture was begun in Holland by what is now known as the "Dutch process." This process, however, can scarcely have been original with the Dutch, since Theophilus, a monk who wrote in the 10th century, describes it very exactly, and the Saracens, Italians, and Spaniards are all said to have used it. With the addition of stable litter banked around the jars, in which small bits of marble are also placed, the Dutch process differs in no way from that described by Pliny, who says: "The lead is thrown into jars filled with vinegar, which are kept closed for ten days; the sort of mold which forms upon the surface is then scraped off, and the lead is again put into the vinegar until the whole of the metal is consumed." The Dutch process has been the one which has proved the best and most profitable. Holland became skilled in this manufacture, and it was also widely used in England. America, on the other hand, had not one establishment for the manufacture of white lead at the close of the 18th century, what white lead was used coming from England; but the primitive habits of the community in those early days caused paint to be regarded not only as a luxury, but, furthermore, as a useless one, since timber was far too plentiful and cheap to require preservation at the expense of paint. After the Revolution more luxurious customs came in, and the use of paint became general in the cities. For the body of this paint all the white lead had to be imported from England. The English product at this time was heavily adulterated, and prices were more than high. So great did the demand become, and so profitable the business to the English manufacturers, that when the manufacture of white lead was proposed and commenced in the United States, the most desperate attempt was made to ruin the new American industry. Had it not been for

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the War of 1812 and the consequent shutting out of British goods, it is highly probable that the white lead industry would have been delayed for many years in this hemisphere. The original manufacturer of white lead in the United States was Samuel Wetherill, of Philadelphia, who began the manufacture of white lead early in the 19th century, probably about 1804. A night or two after the factory opened, it was destroyed by fire. About 1809 the factory was rebuilt, and then began the bitterest struggle any two great commercial interests here and in England ever waged. British lead was put on the market at a price that was absolutely impossible for the American maker to quote. The War of 1812 saved Wetherill from ruin, and under the impetus thus given the industry grew rapidly for a few years, its growth being still further aided by the development of the recently acquired lead regions that Louisiana included. By the census of 1810, Wetherill's factory, the only one in the country, was credited with an annual product of 369 tons. Red lead was also produced in small quantities, but the imports of these two products exceeded the domestic production as two and one half to one. In Philadelphia, where the industry began, the second factory in the country was started by John Harrison, at the Kensington works, about 1810. In the latter year the manufacture of white lead was begun at Pittsburgh by Adam Bielin and J. J. Stevenson. Meantime an Englishman named Smith appeared in Philadelphia as a manufacturer of white lead, and all five of these firms were struggling against the English manufacturer when the War of 1812 came to their relief. All these early manufacturers employed, so far as can be learned, the Dutch process. Certain patents for improvements upon it were taken; but the burning of the Patent Office has destroyed all record of them, except that Samuel Wetherill devised and secured a new and better method "for setting the beds or stacks." Stable litter as the source of the required heat was in universal use. In 1814, Welch & Evans, of Philadelphia, patented a method by which granulated lead, placed in revolving lead-lined barrels partly filled with water, was ground by attrition, oxidized by the air, and carbonized by the addition of burning charcoal. A factory for the manufacture of lead by this process was built soon after by a Mr. Richards, who had succeeded the Englishman Smith, but the venture proved unprofitable. The price of white lead before the War of 1812 was 10 to 20 cents a pound. American manufacturers mainly used the imported pig-lead, and the domestic supply was small. When the importation of the foreign pig-lead was suspended by the war, the price of the native metal took a great jump. A great scarcity of the metal resulted, and the price of white lead advanced to 30 cents a pound. This profit, together with the general resumption of business that came after peace was declared, gave a fresh impetus to the white lead industry. Many new works were established, and older ones extended, so that by 1830 there were 12 establishments in the country, of which 8 were east of the Alleghanies. These factories were not turning out over 3,000 tons annually, and as the price of white lead, following a temporary glut of the pig-lead market, had declined to 9 cents per pound, the total value of the year's output was but a little over \$500,000. About two

years after this Augustus Graham, a prominent New York manufacturer of white lead, discovered, by obtaining employment as a common workman in one of the great English factories, the secret of the use of spent tan-bark instead of stable litter as a means of obtaining heat and carbonization. This knowledge worked a considerable change in white lead manufacture, and by 1840 the annual product had increased about two thirds in the whole country. Prices, however, had advanced little, white lead being quoted at only a cent a pound more than in 1830. The sudden bursting forth into prosperity and productivity of the mines in the Galena and Missouri lead regions, during the fifth decade, had an immediate effect upon the white lead industry. The supply was unlimited, but the question of transportation was a serious one. Waterways were the only freight routes available, and Europe was far nearer to the Eastern cities than those towns situated to the westward of the great bar of the Alleghanies. From the Missouri lead fields, and the Galena region as well, the pig-metal was boated down to New Orleans, and there transshipped by vessel to New York. It was a long journey, and a costly one; and in some sections, not readily within the distributive field of New York or the large coast cities, other means were adopted. Sometimes it was carried in prairie schooners from the mines to Milwaukee, where the lead was shipped in sailing vessels to Buffalo. The years 1850 to 1865 marked no important advance in the lead industry. The introduction of the manufactured zinc oxide as a substitute for white lead, together with the advance in the price of metallic lead under the strong influence of the war-time demand, checked the use of the manufactured product until the return of better times at the conclusion of the war. Furthermore, adulteration, which had long been regarded as permissible by white lead makers, came to the condemnation it deserved, and the purer product developed by this sentiment had its immediate effect in raising the manufactured lead in the public estimation. "Sublimed lead" came to be introduced for use as a substitute for white lead. Its discovery resulted from certain unsuccessful experiments made by Lewis and Bartlett to discover an improved and speedier process for manufacturing white lead. On the whole there has been no improvement on the Dutch method.

The lead oxides, of which a considerable quantity is annually produced in the United States, were, like white lead, first manufactured in the western hemisphere at Philadelphia, where, before the War of 1812, there were at least three establishments. Their manufacture has changed little during 200 years. In making red lead, which is, perhaps, the most important of the oxides, the method is simply to heat litharge in a reverberatory furnace, which immediately changes it from yellow to red. In this country this method is the one commonly employed, although some works substitute a bottle-shaped iron cylinder for the reverberatory furnace. Red lead and litharge are usually manufactured at the white lead works, and there are but few separate establishments for the exclusive manufacture of the lead oxides. Orange mineral, a form of lead oxide produced by heating white lead, is another of the useful products of the metal; and the valuable astringent known

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in medicine as sugar of lead, and chemically as acetate of lead, being obtained by the simple treatment of lead with acetic acid, and without the presence of carbon dioxide, is still another product well known to the commerce of to-day.

The personnel of the white lead industry since its establishment in 1804 has been an interesting one. Outside of those firms already mentioned, only two were established during the second decade, the Cincinnati Manufacturing Company in 1815, and Barney McLennan's works, in the same city, in 1820. Dr. Vandenberg, of Albany, in 1830, together with David Leavitt and John and Augustus Graham, under the title of the Brooklyn White-Lead Works, was operating successfully. Another Brooklyn firm of early establishment was the Union White-Lead Company, started by the Messrs. Cornell about 1827. The Salem Lead Company in 1824, and Francis Peabody in 1826, established the white lead industry in Salem, and Robert McCandless and Richard Conkling established works in Cincinnati during this same decade. During the next decade there were started the Boston Lead Company, in 1831; Great Falls Manufacturing Company, in 1832; Jewett Sons & Company, at Saugerties, in 1838; Gregg & Hagner, at Pittsburg, in 1837; and Reed & Hoffman, at St. Louis, in 1837. This last establishment afterward became the Collier White-Lead and Oil Company. From 1840 to 1850 was a period of rapid growth. Among the larger works established were the Atlantic White-Lead Company, of New York, founded by Mr. Robert Colgate; John Jewett & Sons' Staten Island works; the Great Falls Manufacturing Company, changed by Batelle & Renwick to the Ulster White-Lead Company; Suffolk Lead Works and Norfolk Lead Company, of Boston; the Forest River Lead Company, of Salem, successors to Francis Peabody; Thompson & Company, of Buffalo; B. A. Farnestock & Company, of Pittsburg; Eagle White-Lead Works, at Cincinnati; and William Glasgow, Jr.'s, works, at St. Louis.

The succeeding decade saw less increase. William Wood and T. J. McCoy took the Eagle Works, of Cincinnati; the Niagara White-Lead Company started at Buffalo, and Wilson, Waters & Company at Louisville. This was but a lull, however, that was to give place to renewed activity. From 1860 to 1870 there were founded such great establishments as the St. Louis Lead and Oil Company, which succeeded the O'Fallon White-Lead and Oil Company in 1865; the Southern White-Lead Company, established by Platt & Thornburg in the same year; Goshorn Brothers, who secured the McCandless establishment in Cincinnati, and afterward organized it as the Anchor White-Lead Company; the Eagle White-Lead Company, also of Cincinnati; the Shipman White-Lead Company, organized at Chicago by D. B. Shipman; J. H. Morley's works at Cleveland; Haslett, Leonard & Company, who succeeded Waters in Louisville; Lewis & Schoonmaker, of Louisville, who later sold out to T. J. McCoy and the American White-Lead Company; the Western White-Lead Company, in Philadelphia; the Cornell Lead Company, which succeeded the Niagara Company, at Buffalo; Hall, Bradley & Company, of New York and Brooklyn; the Salem Lead Company, a new company organized by Mr. Francis Brown at Salem; and the Maryland

White-Lead Company, which was established in Baltimore in 1867. Since this period the have been comparatively few large establishments founded. Even in 1870 the tendency toward consolidation was noticeable, and the two largest plants founded during the succeeding decade were absorbed by older companies.

The manufacture of white lead in former years had been very profitable. Such severe competition was the result that many factories became unprofitable. In order to lessen this competition various devices of association were successively tried, and in 1889 H. H. Roger and the late Charles M. Pratt, who both had large experience in the lead and paint business, attempted an organization patterned after the Standard Oil Company. After a period of ill-success arrangements were made by which other great factories of the country, the John T. Lewis & Brothers Company, Philadelphia, the Salem Company, of Boston, the Atlantic Company, of Brooklyn, and the Collier and Southern Companies, of St. Louis, were acquired. The writer then became president, and acquired the important works of Armstrong, McElvay & Company and the Davis-Chambers Company, a Pittsburg. By the end of that year the National Lead Trust manufactured 80 per cent of the country's production of white lead, 70 per cent of red lead, 15 per cent of linseed-oil, 10 per cent of sheet-lead, 9 per cent of lead pipe, and 60 per cent of lead acetate, together with sundry other of the important manufactures of lead. Many small factories operating in a desultory way, with frequent stoppages, were closed for good; works in favorable localities, and capable of producing the best results in any one direction, were devoted to this branch, enlarged and improved, and the best class of employees selected and taken to the more important works. New machinery and more healthful appliance were at once put into use. Schools for mutual education among the more important manufacturers were organized, and the expert knowledge of each placed at the service of all. Efforts to reduce the unwieldy capitalization culminated successfully in 1891, when the Lead Trust was dissolved, and a new company, organized under the laws of the State of New Jersey, with a capital of \$15,000,000 preferred and \$15,000,000 common stock, took its place. The National Lead Company enjoys the unique position of never having borrowed a dollar. Every department is well managed, and the character of all manufactured products marvelously improved and placed upon the market at prices lower than ever before known.

W. P. THOMPSON,
President National Lead Company.

Lead-pencils. Lead-pencil manufacture in the United States did not begin until 1860, but in 1903 there is estimated to be \$4,000,000 capital invested in the industry, and American lead-pencils are sold all over the world. This country is particularly adapted to the production, for it has rich graphite mines, and extraordinary facilities, also, for obtaining this substance from elsewhere; it also has the only great forests of cedar in the world, from which the stock of the pencil is made, and even sends quantities of cedar to foreign pencil makers. Above all, it has had numbers of ingenious mechanics to originate labor-saving machinery. Germany is

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the pioneer country in lead-pencil manufacture, and from that nation came many of the founders of the industry in the United States. Among the first in this country were Eberhard Faber, Joseph Reckendorfer, and Henry Baulzheimer. New York city and vicinity have always been the seat of lead-pencil manufacture in this country, and among the prominent manufacturing firms now located there are the American Lead-Pencil Company, the Eagle Pencil Company, and the works and office of Eberhard Faber; while in Jersey City is the plant of the Joseph Dixon Crucible Company, founded by Joseph Dixon at Salem, Mass., as early as 1826, and moved to Jersey City in 1840. The company did not begin to make lead-pencils until 1872. It is the pioneer graphite company in the United States, if not in the world. The plumbago crucibles (which are identical with graphite) were invented by Joseph Dixon. Graphite now enters largely into every department of the mechanical arts. The American output of pencils is calculated to be 5,000 gross daily. American lead-pencils now supply nearly all the home demand and are sold everywhere. Many novelties in pencils have originated in the United States.

Lead-poisoning. See LEAD.

Leading Star. See LODESTAR.

Leadville, led'vil, Colo., a city and the county-seat of Lake County, 80 miles by rail southwest of Denver, the State capital, on the Colorado M., Colorado & S., and the Denver & R. G. R.R.'s. It is situated 10,200 feet above the sea amid picturesque scenery, near the headwaters of the Arkansas River in central Colorado, between the Mosquito and Sawatch ranges of the Rocky Mountains. Leadville was first settled in 1860 by miners and prospectors, but after a period of comparative prosperity as a gold-mining centre declined with the exhaustion of the first discovered deposits. It revived with the discovery of 1877 of rich lead and silver deposits, followed by the discovery of other gold, zinc, copper, bismuth, and manganese deposits, and is now one of the most important localities in the world for the mining and reduction of the ores of the precious metals, some of the mines being 700 feet deep. Leadville's annual production of metals amounts to \$10,000,000. It is the mining, farming, and grazing trade centre of an extensive region, has fine buildings, including a Carnegie library, opera house, theatre, court-house, jail, hospital, and almshouse, has a parochial school, a high school and four grade schools, two Roman Catholic churches, two Methodist, two Presbyterian, a Baptist, a Congregational, and a Lutheran, is lighted by gas and electricity, has an excellent water supply, and well organized fire and police departments. Besides its large sampling, refining and reduction works, smelting furnaces, etc., its mines employing 4,000 workmen, its smelting 1,200, and incidental to mining and smelting 1,200; it has also iron foundries, manufactures of machinery, ice, jewelry and novelties, and a government fish-hatchery. There are two National banks, the volume of business of the Carbonate National bank in 1902-3 being, receipts \$24,071,492 and disbursements \$24,095,624. The city is administered by a mayor and common council of six members elected biennially. The population,

consisting of Americans, Irish, Swedes, Finns, Austrians, Italians, Germans, Cornish, and English, was (1890) 10,384; (1900) 12,455.

HENRY C. BULLER,
Editor of 'Herald Democrat.'

Leaf-beetle, a popular name for many members of the family *Chrysomelidae* (q.v.), which embraces about 18,000 widely distributed species, about 600 of which are found in North America. The larvæ, which feed upon the succulent parts, either fully exposed, in protective cases, beneath the epidermis as leaf-miners or stalk-borers, are all soft-bodied six-footed creatures with great appetites. Some larvae feed on roots, some are aquatic, and many cover themselves with excrement as a protection against their enemies. The adults of several tropical species are of such brilliant colors as to be used for jewelry when mounted in gold settings. The family includes many species considered serious pests of cultivated plants. Some of the most noted of these are the flea-beetles, tortoise-beetles, potato and asparagus beetles, elm-leaf beetle and the diabroticas, represented by the striped, and the spotted cucumber-beetle. These are treated under their food-plant titles.

Leaf-bug, or Plant-bug, bugs of the family *Capsidae*, which suck the juices of plants. Two hundred and fifty of the thousand or more species described occur in the United States, and all except the predaceous species are vegetable feeders, a few being considered pests. They are generally oval or elongated, yellowish or greenish, sometimes with lines or dots of red or black. All have a decidedly "buggy" odor. Among the best known species are the red-bug or cotton-stainer (*Dysdercus suturellus*), so called because its excrement stains the cotton in the opening boll, thus reducing the grade. It is less troublesome than formerly because the piles of cottonseed in which it used to breed are now used for oil instead of being thrown in heaps to decay. The insect also attacks oranges in Florida. Cottonseed will attract them away from the trees. Another species troublesome on currants, gooseberries, dahlias, etc., is the four-lined leaf-bug (*Paciocapsus lineatus*). Its eggs are laid in the young twigs which may be cut in autumn or winter and burned. The insects may also be jarred off the plants into receptacles while sluggish in the early morning.

Leaf-cutter Bee, one of the large bees of the genus *Megachile*, of which a common species in the United States is *M. cetrularis*. It is a "thick-bodied bee with a large square head, stout scissors-like jaws, and with a thick mass of dense hairs on the under side of the tail for the purpose of carrying pollen." These bees make their nests in the hollow stems of elder-bushes, or, nowadays, often in crevices about buildings, and form their cells of round pieces which they cut out of tender leaves of many sorts of trees and bushes, especially the rose. Many cells are made, each containing an egg and store of pollen, and the whole economy of the group is very interesting. There are many species in various parts of the world. Consult: Packard, 'Guide to the Study of Insects' (1889).

Leaf-cutting Ants. See ANTS.

Leaf-hopper, any member of the family *Jassidae*, which includes a very large number of small bugs greatly varying in form and often

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grotesque. They are especially numerous in grass and grain, which they are believed to injure to a greater extent than is usually supposed. Among the best-known species is the grape-vine leaf-hopper (*Erythroneura vitis*), which is often so abundant in vineyards that the leaves may turn brown from the insects' punctures. They have been effectively caught by tapping the vines to make the insects jump against a screen smeared with tar or a fan similarly covered and kept in constant motion close to the vines. This species is sometimes erroneously called "thrips" (q.v.). Among the best known of the grass-feeding host of species is the destructive leaf-hopper (*Cicadula* or *Limotettix exitosa*). This is sometimes caught in wide pans covered with tar and dragged across the field.

Leaf-insect, or Walking Leaf, tropical species of the family *Phasmidae*, which is represented in temperate climates by the walking-stick (q.v.). They are so called because of the remarkable resemblance of their wings to leaves, not only in color but also in the arrangement of the veins, etc., so that the natives believe that the insects are really leaves which have acquired organs of locomotion, digestion, etc. Their legs also look more or less like twigs, and their eggs, which are dropped upon the ground from the foliage where the insects feed, look very much like seeds. This likeness is of use as a protection from enemies. See MIMICRY.

Leaf-miner, any insect of the superfamily *Tineoidea*, which comprises several families of very small moths, most of whose larvæ feed upon the soft tissues (parenchyma) of leaves and green stems beneath the epidermis, sometimes eating away rounded passages and sometimes long serpentine paths. More than 4,000 species have been described, of which fully 1,000 are American. The adults are often remarkably beautiful, exhibiting under the microscope a covering of lustrous scales. Among the plants that these insects attack injuriously are oaks, pines, maples, and palmettos. Some of the leaf-feeding species have developed the habit of feeding during their later larval days upon the outside of the leaf, either fully exposed or in a protective case. Others have assumed root- and seed-feeding habits; still others have become twig-borers, and gall-formers. Some of the related species live upon animal skins, fur, wool, etc. (See CLOTHES-MOTH.) A few flies of the families *Anthomyiidae* and *Oscinidae* are leaf-miners, as are also some leaf-beetles of the family *Hispini* and some sawflies of the family *Tenthredinidae*. Consult: Comstock, 'Manual for the Study of Insects' (1895); Sharp, 'Cambridge Natural History,' Vol. VI. (1899).

Leaf-monkey, an Anglo-Indian name for a langur (q.v.).

Leaf-nosed Bats, a general term for such bats as have on the snout upright leaf-like growths of highly sensitive membrane which is presumably of great assistance to them in making their way about in darkness, and in finding and taking their insect-prey. (See BAT.) These folds of skin are, naturally enough, called the nose-leaf, and may be comparatively small and simple, or so large as to form a grotesque mask, such as gives so extraordinary appearance to the horse-shoe and other leaf-nosed bats of the fam-

ily *Rhinolophidae*, and to the "false vampires" of the family *Nycteridae*. North American bats show very little of this peculiarity. These complicated membranes are always fringed with long fine hairs, which serve the purpose of the tactile whiskers of cats; and the bats possessing this feature are more thoroughly nocturnal than those in which it is lacking or little developed.

Leaf-roller, Leaf-tyer, or Leaf-sewer, a small moth, in most cases one of the family *Tortricidae*, whose caterpillar rolls a leaf or a part of a leaf into a case, tying it into a cylindrical case with silken bands and lining this case with silk, so as to form a sort of cocoon in which it may transform safely into the pupa stage. In some cases the nest is formed by fastening together several leaves. "In most cases," says Comstock, "the building of the nest is the work of a single larva, but in very many instances several larvæ work to build a common nest." Each species makes its nest of a particular form, and infests some special kind of plant or tree; and many do considerable injury, especially among greenhouse plants and orchard trees.

Leaf-tyer. See LEAF-ROLLER.

League, lēg, a measure of length varying in different countries. The word is supposed to be of Celtic origin, but it has been introduced into the modern languages of Latin origin through the Latin *leuca*. The Roman league was equal to 1,500 paces, each of 5 feet. The English land league is 3 statute miles, and the nautical league 3 equatorial miles, or 3.457875 statute miles. The Italian league is reckoned as equal to 4 miles, each of 5,000 feet. The Spanish league varies very much according to the locality. On the modern Spanish roads the league is estimated at 8,000 *varas*, or 7,416 English yards. The Portuguese league is equal to 3.84 English miles. In the old French measures the length of the league was different in every district, but the three principal leagues were the legal or posting league, equal to rather less than 2½ English miles, the marine league somewhat more than 3½ English miles, and the astronomical league equal to about 2¾ English miles. The metric league is reckoned as equal to 4 kilomètres.

League, political connections which have been called *alliances* since the French language has become the diplomatic language of Europe. Among these are the League of Cambrai, formed in 1508 between Louis XII., king of France, the German emperor Maximilian, and Ferdinand of Spain, for the purpose of humbling the Republic of Venice, and which was joined in 1509 by Pope Julius II. This league was dissolved in 1510, as many similar ones have been, in consequence of mutual distrust, and was succeeded by the *liga santa*, or holy league, between the pope, Maximilian, Ferdinand, and Venice. The object of this was to compel Louis XII., whose allies had now become his enemies, to renounce his conquests in Italy; which object was gained. Thirty years afterward a holy league was formed in Germany. When the principal Protestant princes in Germany united in 1530, and again in greater numbers in 1536, to form the union of Schmalkalden, in order to protect their common faith and withstand the Emperor Charles V., the Roman Catholic princes assembled at Nuremberg, in 1538, to take measures for the sup-

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port of their own faith, and to oppose the designs of the Protestant princes; and as their league had the protection of the Roman Catholic Church for its object, they termed it the *holy league*. A fourth league was headed by Henry, duke of Guise, in 1576, against Henry III. of France. Its ostensible object was the support of the Roman Catholic religion. There was a fifth league in Germany in the 17th century.

Leahy, lē'hi, William Augustine, American author: b. Boston 18 July 1867. He was graduated from Harvard in 1888, was literary editor of the Boston *Traveller* in 1893–4, then entered general literary work, and contributed verse and short stories to magazines. In 1902 he was appointed secretary to the music department of Boston. His works are: 'The Siege of Syracuse' (1889); 'The Incendiary' (1896), which obtained a prize offered by the Chicago *Record*; and a 'History of the Catholic Church in New England' (1899).

Leake, lēk, William Martin, English archaeologist and topographer: b. London 14 Jan. 1777; d. Brighton 6 Jan. 1860. An officer in the West-Indian service (1794–8), and artillery instructor at Constantinople in early life, he later traveled in the East, and was engaged in surveys and diplomatic business for the British government in Greece (1805–9). Among his publications are: 'Researches in Greece' (1814); 'Topography of Athens' (1821: 2d ed. 1841), a learned and still valuable work; 'Historical Outline of the Greek Revolution' (1826); 'Travels in Northern Greece' (1835); 'Peloponnesia' (1840). Consult: Marsden, 'Brief Memoir of the Life and Writings of W. M. Leake' (1864).

Lean'der and Hero. See HERO.

Leaning Tower. See PISA.

Leap Year, the name given in Great Britain to every year of 366 days. The length of the year is a little less than 365½ days. Julius Cæsar, in reforming the calendar, arranged that in every fourth year February should have 29 days instead of 28, and that two days should be called by the same name. The day whose name was repeated was, according to the Roman method of reckoning, the sixth before the calends of March, that is, the 24th February, and the year in which this name was given to two successive days was named *bisextile* (*bis*, twice; *sextus*, sixth). The name leap year is perhaps due to the notion that the calendar takes a leap of one day every fourth year to make up for its ordinary year being one fourth day too short. Every year is a leap year which is divisible by four without remainder, except the concluding years of centuries, every fourth only of which is a leap year; thus the years 1800 and 1900 are not leap years, but 2000 and 2400 are.

Lear, lēr, Edward, English author and artist: b. London 12 May 1812; d. San Remo 29 Jan. 1888. In 1831 he became draftsman to the London Zoological Society. His illustrations of the 'Family of the Psittacidae' (1832) was followed by many other illustrations for zoological works by Gould, Bell, Swainson, Jardine, and Gray. In 1837 he visited Italy and the East, and in those parts spent most of his remaining days, chiefly occupied with landscape painting. He exhibited 'Dead Birds' in 1836, and in 1850 was represented at the Royal Academy exhibi-

tion by 'Claude Lorraine's House on the Tiber.' As an author he is best known by his 'Book of Nonsense' (1846); 'Nonsense Songs and Stories' (1871); 'More Nonsense Songs,' etc. (1872); and 'Laughable Lyrics' (1877). He also wrote 'Views in Rome and its Environs' (1841); 'Illustrated Excursions in Italy' (1846); 'Journal of a Landscape Painter in Greece and Albania' (1851); 'Journal of a Landscape Painter in Southern Calabria' (1852); 'Views in the Seven Ionian Islands' (1863); and 'Journal of a Landscape Painter in Corsica' (1870). Tennyson's verses 'To E. L. on his Travels in Greece' were addressed to Lear.

Lear, Tobias, American diplomatist: b. Portsmouth, N. H., about 1760; d. Washington, D. C., 11 Oct. 1826. He was graduated at Harvard in 1783, and in 1785 became private secretary to General Washington, to whose domestic affairs he attended for several years, and by whom, in his will, Lear was most liberally remembered. In 1802 he was consul-general at San Domingo, and afterward consul-general at Algiers and commissioner to conclude a peace with Tripoli. He discharged this last duty in 1805 in a manner which gave offense in certain quarters, but his conduct was approved by the Federal government. He returned shortly after to the United States, and at the time of his death (by suicide), was employed in Washington as accountant of the War Department.

Lear. Shakespeare's great drama of 'King Lear' was written between 1603 and 1606. The bare historical outline of the story of the King he obtained probably from Holinshed or from an old play, the 'Chronicle History of Leir'; the sad story of Gloster was found in Sir Philip Sidney's 'Arcadia.' The motifs of the drama are the wronging of children by parents and of parents by children.

Leary, Richard Phillips, American naval officer: b. Baltimore 3 Nov. 1842; d. Boston 27 Dec. 1901. He was graduated at the United States Naval Academy in 1860; served during the blockade of Charleston 1863–5; promoted commander in 1882. During the Samoan revolution in 1888 he was the senior naval officer present at the critical moment. He was promoted captain in April 1897; commanded the cruiser San Francisco in 1897–8; and when the New Orleans was purchased from Brazil convoyed that vessel to the United States. At the close of the Spanish-American war he was appointed the first American governor of Guam, and served there till relieved, on his own request, in April 1900.

Lease, Mary Elizabeth Clyens, American writer and speaker: b. Ridgway, Pa., 11 Sept. 1853. She was educated at Saint Elizabeth's Academy, Allegany, N. Y., and after graduating there removed to Kansas, where in 1885 she was admitted to the bar. In 1888, at a union labor convention, she made her first political speech, and in the campaign of 1890 delivered over 160 addresses in the interest of the Farmers' Alliance (q.v.) to the triumph of which that year in Kansas her effective efforts were believed to have largely contributed. She was afterward appointed president of the State Board of Charities, being the first woman chosen to such an office in this country. At the Columbian Exposition she was orator on Kansas day; rep-

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resented Kansas at the National Conference of Charities and Corrections; and was national vice-president of the World's Peace Congress in Chicago, in 1893. She has written much for periodicals; is author of 'The Problem of Civilization Solved'; and has lectured frequently on literary, political, and economic subjects.

Lease, a species of contract granting the possession of lands, tenements, or incorporeal hereditaments, for life or a limited term of years, or during the pleasure of the contracting parties. The grantor is called the lessor and the grantee the lessee. A lease may be in writing or by parol, but the former is more satisfactory, as it usually sets out in regular form and binding terms the respective rights of the contracting parties. A lease contract establishes the relation of landlord and tenant between the lessor and lessee, unless its terms limit the relation of the parties. A lessor who holds an estate for years only may under-lease in such a manner as to establish a technical relation of landlord and tenant between the owner of the fee and the lessee. One of the essential requisites of a lease is, that its duration must be for a shorter period than the duration of the interest of the lessor in the property leased; for if the holder of an interest less than that of a fee leases his interest for the full term of its continuance it would be in effect an assignment or sale of his interest and in no sense a lease. In a lease proper, the lessor reserves to himself a reversionary interest in the property included in the lease. The beginning and termination of which are to be determined by the agreement of the parties. This agreement must also include a designation of the premises, estate or interest, intended to pass to the lessee. A term, however, is perfected only by the entry of the lessee. Even after the making of a lease the estate remains in the lessor up to such time as the lessee actually enters into possession, and the only right the lessee has in the estate is that of making an entry, which must be exercised to give him the additional rights provided for in the lease. All persons possessed of lands or tenements, or interest therein, competent to do business and under no legal disability, as of unsound mind, immature age, or the like, may enter into a lease contract.

Leasehold. A leasehold is an estate held under or by virtue of a lease. An estate for years usually commences by means of a written lease. It is important to distinguish between a lease and an agreement to lease, the former being a completed contract and the latter only a stipulation for the formation of a contract at some future time. It is often difficult to determine to which of the two classes an instrument belongs, without resorting to an interpretation based upon the intentions of the contracting parties. If a lessee fails or refuses to enter into possession under and in accordance with the terms of a lease, the possession remains undisturbed in the lessor, and the remedy of the latter would be by an action for not entering into possession and for consequent damages, rather than for a breach of the conditions of the terms of the lease, the relation of landlord and tenant not having been established before an entry under the lease. A person can convey by lease no greater interest than he possesses in an estate. If the lessor has only a life estate it

terminates with his death, although he may have executed a lease for a term of years not completed at the time of his death. The ordinary powers, duties and obligations of the contracting parties may be increased, diminished, or modified by special provisions in a lease. Many lease contracts provide for all of the contingencies which can ordinarily happen. It is not infrequent that a clause in the instrument provides that the lessee may build upon land leased to him, and that he shall have the right to remove his buildings at the expiration of his term, or purchase the fee. Any provision not illegal or inconsistent with public policy may be an incident of a leasehold.

Leather, Shoe, Manufacture of. The art of manufacturing raw hides into leather has been known for centuries, but only through many changes and improvements did the industry reach the perfect condition it has developed into at the present time. Until a half-century ago the leather turned out was at its best crude, and to-day would not be considered fit to be used. But since the introduction of machinery which simplified the process and reduced the time of tanning to from 90 to 120 days on sole-leather, and incidentally lessened the cost, better leather is being turned out; and each year brings forth some new invention that further perfects the process and reduces the time and expense. Until within about 20 years bark was relied upon as absolutely essential to manufacture good leather, but extracts were introduced which did away with bark in part, and to-day there are tanneries that manufacture leather by quebracho and other extracts entirely. There have been many adverse comments on the extract tanning, but it is the process of the future, and tanners who have no faith in it and predict failure should visit some of the tanneries where extract-tanned leather is made, and see what excellent results are produced in 45 days, or little more than half the time that tanners who do not use this process take to tan their hides into leather.

The chrome process is another great invention that simplified the art, and manufacturers are enabled to turn out better leather at less cost and in much less time than by the old process. The chrome process is now in general use in the manufacture of upper leathers, and with excellent results. It was only a short time since that the chrome tannage came into general use in the manufacture of patent leather for shoe purposes, and to-day it is used extensively, as it gives a better grain and a tougher and more pliable leather than was obtained under the old process. Tanners and chemists have for years been trying to tan leather, both upper and sole, quickly and cheaply, and all sorts of inventions have been tried, with the result that the time has been cut down considerably; and in recent experiments the tanning of leather was accomplished in about 30 days for heavy leather by the use of extract and the drum to tan the hides in—a saving of from 60 to 90 days. This is of great benefit to the tanner; it brings him much nearer the hide-market than when leather was only tanned in three to four months, and he is not compelled to take such long chances on the market.

Leather manufacturers are divided into two great classes; namely, the sole-leather tanners and those that manufacture upper leathers.

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Each of these classes is variously subdivided, some making oak sole-leather, some union, and others hemlock. The upper-leather tanners are divided into patent-leather tanners, for shoe purposes, and for carriage and furniture use, glazed-kid tanners — glazed kid being commonly known as "vici kid," from the fact that the first man to use the process whereby good glazed kid was manufactured called his stock "vici" calfskins, etc. There is a difference in the process of tanning these different varieties, and various kinds of hides and skins are used; skins, for example, that are adaptable for the manufacture of glazed kid could not be used to manufacture calfskins; again, hides that are used for patent-leather purposes could not be used with any degree of success in tanning some kinds of sole-leather.

Sole-Leather.— This is made in three different kinds — hemlock, oak, and union. Hemlock sole-leather is divided into acid, non-acid, and slaughter acid. For the acid leather dry foreign and green hides are used, such as Bogotas, etc.; Central American, Orinoco, Buenos Ayres, Chinas, Bufaloes (hides that come from Calcutta), etc. For non-acid leather dry hides only are used. For acid slaughter leather green hides are used.

In the tanning of dry hides, they are first prepared by soaking, then they are milled, re-soaked and sweated, unhaired, and unfleshed. When the hide has reached this stage it is ready to be put through the tanning process, and not before. The reason of this is that dry hides must be brought back to their original condition; that is, the same condition they were in when they were taken off the animal.

In acid leather, when the hide has reached the stage where it is ready for the tan-vats, that is, after it has been unhaired, it is first put into a vat for coloring with a weak tanning liquor, either sweet or sour, sweet giving a deeper grain than sour liquors; tanners use either as preferred. In order to plump it, the hide is then put into sulphuric acid for one day. This acid is about $\frac{1}{4}$ to $\frac{1}{2}$ per cent in strength. The hide is then put through the different layers of liquor in the tannery, beginning with a low degree liquor, and gradually increasing through liquors of greater density, until the hide is tanned through and is now leather. After removal from the last liquor it is washed in a scrub-wheel, in order to remove any liquor that may remain in the hide, and is then bleached. The principal materials used in bleaching are sal-soda and sulphuric acid. From the bleach the leather is piled up for a day, in order to drain out the excess of water, and then given an application of cod or other oils on both the grain and flesh sides. The leather is then hung up in a loft to dry. After drying it is taken down and sprinkled with water upon the grain side, and laid away in boxes over night. The object is to assist in the better preparation of the leather for rolling, which is the next process it goes through. From the boxes the leather is rolled twice the same day, once in the morning and again in the afternoon. From the second rolling it is hung up in a warm loft to dry out perfectly before being shipped out of the tannery, ready for the market. From the time the hide leaves the liquor until finished the process is the same for all classes of sole-leather.

In non-acid hemlock leather the beam-house work is exactly the same as in acid leather until it goes into the coloring mill, they both being made out of dry hides, and the same process must be gone through to prepare them for tanning. When the hide has gone through the beam-house and been unhaired it is put directly into vats of weak liquors, and is plumped by being handled in a series of weak liquors for a period of 10 to 12 days. The rest of the process is the same as in the case of acid leather above. The liquors that the hides are put through in order to be tanned are made from bark and extracts. The principal extracts used are quebracho and hemlock, acid and non-acid leather being made from hemlock-bark and extracts, which give it the rich red color that distinguishes it from other tannages. Tanners use extracts in part (some use them altogether) for tanning, as they are cheaper than bark and produce better work. One ton of solid extract is equal to 10 tons of bark, and the advantages of using extracts are the shortening of the time of tanning, and the production of a better filled and firmer piece of leather, with a far brighter and lighter color.

Hemlock acid slaughter sole-leather is made from green hides. To prepare these for tanning, they are first soaked, then put into limes, and then fleshed. Some tanners reverse this method. Next, the hide is bated, that is, given a bath of lactic or acetic acid, to remove the lime; this is called "bating the hide." The lime softens in this bath and dissolves the cells, so that the hair can be removed either by an unhauling-machine or on the beam by hand. From this part on most tanners plump in sulphuric acid, and carry on the process just as with acid leather. It takes from 90 to 120 days to tan hides into leather.

In making oak sole-leather only green hides are used, Colorado, Texas, and packer hides, etc. There is very little difference in tanning the various kinds of sole-leather, and the same formula that is used in tanning non-acid hemlock leather can be applied to oak sole-leather, with the exception that the hides must be limed, instead of being sweated, to remove the hair. Oak is a light-colored leather, and this color is got by using oak-bark, or oak-bark and extracts combined in the liquors, while the hides are going through the tanning process.

For making union sole-leather the same hides are used as for oak-leather — green hides — and as the name denotes, it is made by a union of hemlock and oak-bark; or in some cases oak-bark is done away with and extracts are substituted, the principal extracts used being chestnut wood and quebracho. The treatment gives a yellowish color by which it is readily distinguished from oak. The manufacturing process is exactly the same as in tanning oak-leather (see above).

Upper Leathers.— There are several different kinds of upper leathers made, but the principal ones are glazed kid, patent-leather, and calfskins. Glazed kid is made from dry goat-skins, which are imported to this country, as but very few goats are raised here for their skins. In those foreign lands from which the greater number of skins come the industry of raising goats is made profitable, since not only is the skin used for tanning purposes, but the

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flesh is sold to the inhabitants for food. The skin is first soaked, and then milled, after which it is put into lime, in which it stays for a period of 12 to 14 days. It is then unhaired, principally to save the hair, which is sold, and the skin is put back into the lime. After the skin has been unhaired and properly limed, it is washed and fleshed, then it is pured, that is, the skin is cleaned in order to make it ready for the other process. The skin is now ready to be tanned, and is first given, for a few hours, a bath of bichromate of potash and muriatic acid, after which it is put into a drum overnight, in the same liquors. In the morning the skin is taken out of the drum and is "put-out" by a process of pressing out the liquor and flattening the grain. It is now given a second bath, this time in hyposulphite of soda and muriatic acid, which completes the tanning process.

After the skin has been thoroughly tanned it is washed to get the acid out, and is then "put-out" again before it goes into the drum to receive the stain or coloring matter. When the stain has been put on the skin it receives the fat liquor, which consists of soap and oil. This is done in order to give the skin life, as otherwise it would be too dry, and not strong enough to be useful for the purpose intended. After the skin has received the fat liquor it is pleated (doubled up with the grain out, and slicked to get the water out of the grain, and also to smooth out the grain). The skin is now ready for the coloring process, and is colored by dipping it in a color-box, the color being composed of logwood and copperas. Some tanners also use anilines to give the skin the black color. It is now washed by dipping it in water, and is then "struck-out" on the machine, a process which flattens out the grain and clears the skin of water. The skin is now taken and glycerined, and then oiled, after which it is hung up to dry. After the skin has been thoroughly dried it is kept a few days to season, and is then put into damp sawdust to moisten, as otherwise it could not be properly worked. The skin is then staked by the machine, for stretching and softening the skin, is then dried, and receives a perching, which consists of a light staking again. The skin is now ready to be seasoned, the principal ingredient of the seasoning matter being blood of cows, steers, bulls, etc. The skin is now again dried and ready to receive the first glazing, which is done by machine. After glazing, the skin is seasoned a second time, dried again, and receives a second glazing. It is seasoned for the third time, dried, and receives the finishing glaze. The skin is now ready for the market, and is measured and selected for quality and weight, when it is sold to the shoe manufacturer, who cuts it up into shoe-uppers, etc. The complete tanning process, from the time the skin is put into the first soak until it is ready for the market, takes from three to four weeks.

Another simple process of tanning goatskins of the cheaper variety is the one-bath chrome tannage, which combines low cost with good leather. The skin is first given a very thorough liming, in order to get the grain and fibre as soft as possible. After liming, the skin is bated thoroughly in manure-bait, in order to overcome as much as possible the roughness and coarseness of the grain. The grain is now

thoroughly worked out, and the skin washed and put in pickle. The pickle is composed of salt, sulphuric acid, and water. So much water should be used that the skin can easily be stirred about in the pickle; during the first hour it is stirred continually, after which it may be allowed to rest for several hours with occasional stirrings. From the pickle the skin is then drained and is now ready for tanning.

For each 100 pounds of skins, a solution composed of eight gallons of water and one pound of Glauber's salt is put into the tanning-drum, the temperature of the solution being 90° F. The skin is then placed in the drum, which is run steadily for 15 minutes and then stopped, the skin thrown back on the pins, the plug pulled out, and the salt solution drained off. The plug is then replaced and about ten pounds of common salt and eight gallons of water to 100 pounds of skins is put into the drum. The skin is milled in this solution for about five minutes, and then there is added to the salt water and skin one gallon of one-bath chrome liquor for 100 pounds of skins, in which the skin is milled for half an hour, when another gallon of the liquor is added and the skin milled again, this time for an hour, when a third gallon of the liquor is added, and the drum is run steadily for two hours for skins of average thickness, and three hours for heavy and thick skins. At the end of this time the skin should be well tanned, but in order to complete the process and have the skin thoroughly tanned, it is necessary to add one half-pound of bicarbonate of soda dissolved in two quarts of warm water, and to have the skin milled for about three quarters of an hour. The skin is next removed from the liquor, allowed to drain for 24 hours, and then washed. For washing tanned leather, two pounds of borax is used for 100 pounds of skins. The skin is now washed for a few minutes in clear water and either struck out or pressed and shaved, after which it is ready for the coloring, fat-liquoring, drying-out, and finishing.

The introduction of patent and enameled leathers marked a notable step in this industry. The composition made by Seth Boyden more than 50 years ago induced leather manufacturers to prepare a leather for its acceptance. The first leather made was in oak and hemlock bark liquors. At that time the only known means of splitting hides was by the Union splitting-machine, operated by hand. The hide was partially tanned and then split on this machine, dividing it into three parts—the slab or leveler, used for shoe purposes such as insole stock; the next, known as a dash-split; and the upper part, called the hide or grain. The hide and the dash-split were then returned to the liquors and thoroughly tanned, after which the hide was taken by the currier and buffed on a beam in a wet state, as it was found to be impracticable to japan with the Boyden compositions on the natural grain. After the hide was buffed and the grain divided, the hide and the dash-split were taken to the "japanery" and coated in the following manner: The first coat, called "sweet-meats" by the mechanics, was made of raw linseed oil, to which, after boiling for 24 hours in heats varying from 400 to 550 degrees, umber and lampblack were added. After boiling, the mixture was cut with turpentine, so that the

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japanner could spread it on the surface of the hide with a steel slicker. When coated, the hide and split were placed in ovens operated with slides, and dried in heats running up to 160° F. After each coat was dried, the rough surface was ground off by using pumice-stone, and no less than two or three coats, according to the character of the leather, were applied. The leather was then in readiness for the finishing, or varnish coats. This varnish was made by boiling linseed oil in the same manner as the sweetmeats, and adding thereto Chinese blue-lumps, in a proportion of about four ounces to the gallon of oil. The varnish, like the sweetmeats, was reduced with turpentine, and from 1 to 11 coats given the leather, according to the face and finish desired. After this was done the leather was taken from the ovens and exposed to the sun-shine, which set the finish and the lustre. The leather was then taken off the frames, placed in a cooling-cellars, and left there from 24 to 48 hours, after which it was measured and ready for sale. In the manufacture of patent leather the use of turpentine for reducing compositions was not only dangerous, since combustion was probable, but also injurious, as it went to the brain of the operator, and often blood would run from the nose and ears as a result of congestion. A man japanning could not stand the fumes for over half an hour at a time. However, as time went on, turpentine was done away with and its place taken by naphtha, a product of petroleum, and to-day nine tenths of all shiny leathers are made with naphtha as a reducer of the compositions.

For years after the first patent leather was made, only what was known as hand-buffed could be produced, as the grain had to be cut off by the currier, on the beam, and the part taken off was useless. By this time, in the 70's, the Union machine had been improved to such an extent that the hide could be buffed on it, and instead of a part being thrown away, it was finished for pocketbook, bookbinding, and hat-sweat purposes, in all of which it took the place of roans and sheepskin skivers, and the hide from which it was taken was made into what was known as machine-buffed, patent, and enameled leather. Machine-buffed patent leather for carriage and other purposes has been sold for from eight to ten cents less per foot than the hand-buffed leather was and is now sold for. Later the manufacturers were enabled, with the advent of the endless-knife machine, to take off a lighter buffing than with the Union machine, and also to take off a heavier one if desired. This led to the use of the heavy buffing for shoe-tipping, and attracted the attention of the patent-leather men generally to the possibility of competing with France and Germany in the making of shiny leathers, not only for tipping, but for vamps as well. For many years this competition went on with indifferent success, until the chrome tannage was introduced, and the shoe-trade found that its application to all kinds of skins produced upper leather superior to the best bark and sumac tannage.

To the manufacturer of patent and enameled leather is largely due the cheap patent shoe-leathers that are in the market to-day, and which seem to have come to stay. Manufacturers experimented with the chrome process until they

were enabled to split cow, steer, and horse hides successfully out of the limes, and then tan the grain in one-bath or two-bath chrome liquors. After they had accomplished this, they found that in order to enable them to make up their chrome-tanned grain into shiny leather for vamp purposes, that would last without cracking or opening, they would have to change from the old compositions and invent such as would enable them to finish the hide in the grain without buffing and with one varnish or finish coat, instead of from three to seven as before. Their success is known to the trade, and it is now in order to note the difference between the old and the new compositions, that of Seth Boyden and that in present use. To-day the most successful manufacturers are making their compositions as follows: The under-coats are made of a solution, the component parts of which are guncotton, amyl acetate, linseed-oil, Prussian blue, nigrosine, and other mineral colors. By the old process it took from 24 to 48 hours to soak the hide, and from eight to ten days to unhair and bathe them. After that the hide was struck sufficiently through for sammying and splitting, which took 21 days. The splitting took in actual machine-work and preparation six days or so, and it required at least ten days more or retain the parts. The leather was then set out and dried on stretching-frames, after which it was softened, patched, and otherwise prepared for japanning, the whole of the latter process taking about ten days, according to the time it took to dry, which was never done by heat. In the japanning the hides were tacked on frames, and a day was allowed for each coat to dry, up to the time of the last varnish-coat, which was allowed a little more time. The sunning, stripping, and swelling ordinarily took about three days, making in all 72 days to finish hides into leather.

The manufacturing of leather by the chrome process, where manufacturers use the old method of unhauling and bathing, would need as much time as in the old process, but the most successful manufacturers consume time in the production of their leather as here stated: Soaking and hairing require three days; killing the acid in this process, three days; all the fleshing and other beam-house work, done in the old process by hand, they now do by machinery; two days are allowed for preparing and splitting, and five days for tanning, coloring, fat-liquoring, and dripping; one day is then allowed for table-work, and four days for sammying, staking, and drying, after which the hide is put into sawdust for two days to moisten, then stretched and drystaked, for which two days are allowed; four days are given for japanning, after which the hide is put in the sun for part of one day, two days being allowed after this process for swelling; making in all 27 days—a saving of almost two thirds in time. Except the japanning, which is still done by hand, nearly all the work done under the old process by skilled labor is done under the new chrome tannage by machinery. It must be remembered, however, that when the manufacturer of the chrome upper-leather splits the hide, the split and slab do not generally go back to chrome, except where the manufacturer is able to produce from a chrome-tanned split an article of commercial value. He puts his split

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through the old bark-tannage process, in order to find a market for it, as he did before. A comparison of these two processes, and the material used, will show that the present cost of tanning, up to the japannery, is less than one half the cost of the old bark-tannage; but in the japanning, including the compositions used on chrome leather, the new process is nearly twice as costly as the old. See also HIDES AND LEATHER; TANNING.

J. GODDARD BROWN,
New York Manager of 'Shoe and Leather Reporter.'

Leather, Artificial. Owing to the demand for leather being in excess of the supply, many fabrics have been introduced with the intention, more or less successful, of supplying its place. An article of this sort known under the name of leather cloth, was first produced in America about 1849, and was brought well under the notice of the British public at the Exhibition of 1851. A textile fabric (generally unbleached cotton, calendered to make it smooth) is coated with linseed-oil, turpentine, lampblack, and other ingredients. It is then scraped with a knife to produce a uniform surface. It is afterward dried in a heated oven, and is passed between rollers covered with pumice dust to rub the composition smooth. These processes are repeated several times. Three or four coats of a sort of enamel paint are then applied. The grain of morocco leather is imitated by passing the cloth between grooved rollers; or patterns in relief may be obtained by passing it between embossing rollers. Another kind of artificial leather is made of leather parings and shavings reduced to a pulp, and then molded into buckets, machinery bands, picture-frames, and other useful and ornamental objects. Vegetable leather consists of caoutchouc dissolved in naphtha, spread upon a backing of linen. All odor of the naphtha is removed by a chemical process, and the fabric may be made of any thickness by additional backings of linen cemented with the caoutchouc. Its strength is almost marvelous, and it can be produced at about a third of the price of leather. It may be used for table-covers, carriage-aprons, soldiers' belts, harness, bookbinding, etc. It has several advantages over leather proper, among which we may mention, that however thin the imitation is, it requires considerable force to tear it; it is impervious to damp; moisture may remain long upon it without injuring it, and its polish is increased rather than decreased by friction. Various other substitutes of leather have been recently introduced, consisting of the application of oily pigments to cloth, or thin layers of leather attached to cloth, felt, or other backing by caoutchouc cement.

Leather, Chamois. What is known in the market as chamois skin is really an oil-tanned sheep or lamb skin lining. The supply of skins from the chamois animal is very limited; enough could not be obtained in a year to supply the United States for more than a single day. In Switzerland about five thousand to six thousand skins would be a fair average yearly crop. This skin is heavier than the skin of the sheep or lamb, also much coarser. For strength and durability this skin is preferable, but for ordinary use and appearance the oil-tanned sheep

skin lining would, in most instances, be preferred.

To manufacture sheep or lamb skins into chamois leather the first step necessary is to remove the wool, which is accomplished either by painting the skin on the inside with a solution of sodium sulphide or by immersion in milk of lime. By the former method the wool is loosened in a few hours; by the latter method it will require several days. When the wool is loose, it is pulled off either by hand or scraped off with a dull instrument. The skin is now again immersed in milk of lime, to swell it. It is then cleaned (beamed, as the trade calls it), to remove all fleshy particles that may adhere to it. It is now ready for splitting. The chamois skin is really only the half of a skin. The outside, that is, that part of the skin next to the wool, known as the grain side, is not suitable for chamois leather, and is used for other purposes, mostly for hat linings, book covers, etc. In former times, when skins were prepared for oil tannage, this part of the skin was cut away with a suitable knife and thus lost. In our days the skin is cut through the centre (split), thus producing two skins from one—the outside, called grain or skiver, and the inside, called lining or flesher. The splitting is accomplished on machines specially constructed for this purpose. It consists of an endless knife, the edge of which is constantly grinding to keep it sharp, the skin being passed through rollers against the sharp edge of the knife. These machines require very delicate adjustment to produce good results.

The lining or flesher is now ready for tanning. This is accomplished by sprinkling it with oil, codfish oil of good quality. It is important that this oil should be thoroughly incorporated into the skin. For this purpose a quantity of the skins are placed into what are known as fulling stocks, which twist and turn the skins in every direction, and distribute the oil evenly. After sufficient milling the skins are partly dried and the process of sprinkling and drying is repeated again and again until they are full of oil, and all the moisture is dried out. They are now allowed to hang sufficiently long to thoroughly tan them at a temperature of about 100 degrees. The process after this is very simple. The oil is removed by pressure, and the balance washed out by saponification; after this they are dried and they are then ready for finishing. The oil, by the way, is recovered, by decomposing the soap solution with an acid and separating. It is sold to manufacturers of other leathers, it being useful to make them pliable, etc. The finishing is done mostly by pressing the skin against revolving wheels, covered with emery or flint to remove all adhering substances and to present a finished surface. We now have the finished chamois leather ready for the trimming and sorting room, where it is cut into suitable sizes and packed for the market. Of late years, a trimmed skin, that is, skins of even sizes, are preferred by the trade. For this reason most manufacturers, at least most American manufacturers, cut their skins over patterns so as to produce uniform sizes. In former years, when England and France supplied the United States market, the skins in the same package would vary in size and shape, thus lacking uniformity. See also HIDES AND LEATHER.

LEATHER-BACK — LEAVES

Leather-back, or Leather-jacket. See LEATHER-TURTLE.

Leather-beetle, one of the dermestid beetles (see DERMESTES), which in the grub state damages leather in storehouses and after it is made up into articles, such as shoes, harness, etc. The species is *Dermestes vulpinus*; and it is also a pest in silk manufacture, eating the cocoons. Infested places should be thoroughly fumigated with bisulphid of carbon, or some other powerful gas.

Leather-fish. See FILE-FISHES.

Leather-head, an Australian bird, the friar-bird (q.v.).

Leather Turtle, or Trunkback, a rare marine turtle of the tropical seas (*Sphargis coriacea*), which has a leathery case instead of a shell. It is the largest of existing *Chelonia*, known specimens having a case four feet in length, and a live-weight of not less than 1,000 pounds. When young its case is thin, soft and flexible, but as age advances the jacket becomes stiffened by the formation within it of great numbers of little adjoining bony plates; and the exterior shows strong longitudinal ridges. These turtles are powerful swimmers and wander throughout the oceans, feeding upon jellyfishes, crustaceans, cuttlefishes and other animal food. Late in the summer it seeks some sandy shore or islet, where the female buries her eggs after the manner of other sea-turtles. These eggs are good to eat, but the flesh of the animal is not of good taste, and is said to be unwholesome. Much interesting discourse upon the curious structure, relationships and ancestry of this declining race may be found in Gadow's 'Amphibia and Reptiles' (London 1901).

Leatherstocking Tales, a name given a series of Indian and pioneer romances by James Fenimore Cooper (q.v.). The name Leatherstocking was given to Natty Bumppo, one of Cooper's heroes.

Leatherwood. See CYRILLA.

Leavenworth, lēv'ēn-wért̥, Elias Warner, American lawyer: b. Canaan, N. Y., 1803; d. Syracuse, N. Y., 1887. He graduated at Yale College in 1824; studied law with William Cullen Bryant at Great Barrington, Conn., admitted to the bar in 1827, and began practice the same year at Syracuse, N. Y. He was secretary of state of New York, 1854-5; president Board of Quarantine Commissioners, 1860; 1875 to 1877 he was a member of Congress. He published 'Genealogy of Leavenworth Family' (1873).

Leavenworth, Kan. the county-seat of Leavenworth County and one of the most important cities in the State, 26 miles northwest of Kansas City, on the west bank of the Missouri River, here spanned by two fine iron bridges, accommodating railway and ordinary traffic. The Missouri P., Union P., Atchison, T. & S. Fe, Kansas City N. W. and C. G. W. R.R.'s enter the city, which also is the eastern terminus of the Kansas Central Railway, and the Rock Island and Burlington systems. Leavenworth was founded by the "Sons of the South" in 1854, and the following year received a city charter. During the negro-emancipation agitation it was a strong pro-slavery centre. It derives its name from Fort Leavenworth north

of the city, the oldest and most important military depot on the Missouri River, built in 1827. Leavenworth is the trade centre for a farming and coal-mining region, an inexhaustible coal deposit underlying the city at a depth of 700 feet, giving employment to over 1,000 miners, and yielding 60,000 bushels of coal daily. Besides its coal mines, the manufacturing industries are correspondingly extensive and include flour-mills, woolen-mills, iron foundries, manufactures of mill machinery, mine machinery, steam-engines, lumber, furniture, saddlery, brooms, baskets, buggies, wagons, shoes, patent medicines, bags, ice, crackers, candy, cycles, and dye-works.

The city, which is protected from inundation by a limestone stratum, is well laid out, electrically lighted, has an excellent water supply, and a complete system of electric street railroads, connecting with Fort Leavenworth on the north, and the National Soldiers' Home on the south. The principal buildings are the Catholic pro-cathedral of the Immaculate Conception, over 25 churches of all denominations, the Kansas State Orphan Asylum and protective home, Cushing and St. John's hospitals, two theatres, three national banks, two savings banks, etc. The educational institutions include Mount St. Mary's Academy, a high school, State normal school, and the Whittier library. The suburban Soldiers' Home accommodates 3,000 veterans of the Civil War, and is situated amid attractive grounds. A garrison of 12 companies of United States infantry and four troops of cavalry occupy Fort Leavenworth; the United States Infantry and Cavalry School for the instruction of army officers, and the United States military prison holding 800 prisoners are also situated here, and a mammoth bronze statue of Gen. U. S. Grant. The city is administered by a mayor and council elected biennially. Pop. (1890) 19,768; (1900) 20,735.

Leaves, in the ordinary sense of the word, are the structures on which devolves the duty of nourishing the plant. They invariably arise as lateral protuberances from the growing-points or terminal vegetative cones of the shoots, that is, from a part of the plant which is still in an embryonic condition. In cases where a leaf seems to arise from an older part of a plant, as from the trunk of a tree, close inspection shows that it is really developed from a shoot perhaps not readily visible. Its growth is first at the apex, but this soon ceases, and is followed by continuous enlargement throughout the tissues, by which the upper part or blade of the leaf is soon distinguished from the basal part, and the stalk or petiole (where present) is subsequently formed between them. The development may result in a variety of structures, some of which are far different from typical foliage-leaves, yet are strictly homologous; such are scale-leaves, bracts, and the parts of a blossom (floral leaves). The higher the rank of the plant in the scale of development the more these diversities are manifested; and the observations here to be made apply mainly to the phanerogams from the ferns (q.v.) upward.

Leaves collect from the atmosphere the great essential of plant-food, carbon, and conduct the processes of its assimilation, or, in other words, apply it by chemical conversion to the vitality and growth of the plant. In order to under-

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stand how they perform this function it will be necessary to investigate their structure and properties. Each leaf is composed of three parts, an outside layer on each surface of compact, flattened, and usually colorless cells, forming a skin or epidermis; an inner part (mesophyll) consisting of irregular cellular tissue and inter-cellular spaces. These cells of the mesophyll contain minute bodies (chloroplasts) of green coloring matter called chlorophyll, which also abounds in the bark of the stems of herbs and all other green parts of plants, and is the working element in their composition. Through the spongy mesophyll extends the network of veins which form the skeleton of the leaf, and are at once its support and its channels of communication with the other parts of the plant; these form the third part of the leaf. One other important feature must be mentioned—the breathing-pores, or stomata. These are excessively minute openings in the epidermis, which occur wherever chlorophyll lies underneath, but are most numerous on the under or earthward side of the leaves, where, on the average, about 60,000 may be counted per square inch of surface, although in some leaves they are six or eight times as numerous. Each of these pores lies between the "guard-cells" which form an automatic valve, opening or closing the pore, by their swelling or shrinking, according to varying conditions and the requirements of plant-health, especially in respect to evaporation. The chlorophyll grains (chloroplasts) also change their positions in the cells so as to take all possible advantages of a weak illumination, or to guard against a bad effect from excessive light.

Of the ten essential elements of plant-food nine are drawn from the soil by means of the roots, but the tenth, which is the most important and the largest in amount of all, is obtained by all green plants solely from the carbonic acid of the atmosphere, and is taken up by the green leaves alone; also a little of the oxygen required. The air enters the stomata, is seized, as it were, by the chlorophyll, and within it is so decomposed (in a manner not yet explained) that the carbon is chemically extracted and is transformed into plant-food and plant-substance, that is, is assimilated; and botanists restrict their use of the term "assimilation" to this physiological absorption of carbon alone. In order to be able to do this work, however, the leaves require the aid of sunlight, without which the chlorophyll becomes inactive, and in total darkness a green plant will speedily die of starvation, however rich may be the soil in which it is rooted. The "rest" of plants at night is thus accounted for; and also the greater rapidity of growth in northern plants where in summer they enjoy more hours of sunlight each day than southern plants get.

But the service of leaves in the nutrition of the plant does not cease here. They perform a most important function in the transpiration of water. Plants must always draw from the soil a quantity of water far in excess of their needs, or of their capacity to hold, in order to get a sufficient supply of the mineral food dissolved in it, but in exceedingly small quantities; and after that sustenance has been extracted the extra useless surplus of water must be got rid of. This is accomplished through the

stomata of the leaves, out of which water is always passing in gaseous evaporation, or sometimes even in globules. A secondary, but most important accompaniment of this is the suction thus formed, by which the constant up-flow from the root-ends is maintained.

A third essential office of leaves is as the lungs of the plant, which must breathe in essentially the same manner and for the same purposes as does an animal; that is, they must take up oxygen and give off carbonic acid. This independent process (the converse of the simultaneous assimilation) is carried on steadily by all plants, night and day; but in those having leaves it is mainly performed by these organs, because they spread the greatest surface.

In addition to these foremost and general services, leaves are adapted in particular cases, almost as numerous as the plant species, to such special purposes as a depository of food for the young plant in the cotyledons or seed-leaves; as bulb-scales in plants like the hyacinth and lily, where part of the nourishment in the foliage of one year is stored up in the scales or subterranean thickened leaves, for the early growth and flowering of the next year; as bud-scales, forming the protective coverings of buds, as tendrils, pitchers, fly-traps, etc.

These complicated requirements and duties, under varied conditions and circumstances, have produced the extraordinary modifications of form and texture which leaves present, and which must now be briefly considered.

Forms and Arrangement of Leaves.—The typical and ordinary foliage leaf is a thin flat structure composed of stalk (petiole) and blade (lamina) of symmetrical form, and growing in the plane of the horizon, so that one side (the dorsal) is presented upward to the sky and sunshine, and the other (ventral) is downward and in shadow; and these sides usually present appropriate differences in texture, the upper surface being usually more smooth and compact than the lower. A great variety of textures, from smooth, polished or waxy, to rough, downy or spiny, are distinguished by botanists, and used in the description of plants; these variations of surface are largely defensive in their character. Some leaves have no stalk, and are said to be sessile, in which case the base of the leaf may partly clasp, or completely surround the stem, or be otherwise modified; similarly the stalk takes many forms, sometimes with two lesser subsidiary leaves (stipules) at the base. The rigid woody centre of the stalk may continue straight on through the middle of the leaf to its apex, forming a midrib which throws out branches alternately on each side toward the margin of the blade, each again branching repeatedly and connecting with its neighbor, and so forming a network or skeleton of woody fibres which strengthen and support the leaf. These ribs are called veins or nerves, and the whole is the "venation" of the leaf. Such a simple leaf (for example of the beech) is called reticulate or net-veined. In a large class of cases, however, the branches of the midrib do not spring at approximately equal intervals along its length, but all diverge from a point near its base, making a palmately veined arrangement, as in the maple. This reticulate veining is characteristic of dicotyledons. In another very distinct type of venation, character-

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istic of monocotyledons, there is no midrib, but the stalk divides at the base of the blade into many equal veins which extend in a more or less curving line through the length of the leaf, converging at the apex; such a leaf is said to be parallel-veined, as in grasses. Upon the plan of the skeleton depends mainly the form of the leaf, of which a great number of variations are named in botanical manuals and used in descriptions of species, depending mainly on the character and extent of the indentation or incisions.

The arrangement of leaves upon the plant is an important matter. That it follows certain regular plans is apparent in buds, which when cut across exhibit their young leaves packed together in one or another of certain definite ways; and their relative position on the stem of an herb or the twig of a tree follows as a result of the law of growth in that group. The theoretical perfection of arrangement, however, is often greatly disturbed by the interference of older leaves with the development of the younger, and by other causes affecting the unsymmetrical growth of the whole plant. The arrangement of leaves upon the stem, called *phyllotaxis*, is in most cases one of alternation, thus securing the uninterrupted exposure of the upper surface of the leaf to the sun. It is to obtain this exposure that plants struggle to become tall, and bear their leaves most profusely at the summit; and that the branches of trees reach outward as far as possible; and the lower early leaves of many soon die off because shaded by the later, higher growth. The arrangement is carried out in two principal ways: the leaves are either alternate, one after another, only a single leaf arising from each node or joint of the stem; or opposite, when there is a pair of leaves on each joint of the stem; but sometimes the leaves are whorled or verticillate, there being three or more in a circle on one joint of the stem. The result of this arrangement in an alternate-leaved stem is to cause the leaves to follow one another up the stem in a spiral manner; while any two successive leaves on the same species will also be separated from each other by just an equal portion of the circumference of the stem. The same principle governs the parts of the flower (q.v.) in which the sepals of the calyx typically alternate with the petals of the corolla, the petals with the stamens, and the stamens with the pistils, but it is often disguised in a very puzzling way, especially by the absence of one or more series of organs. See FLOWER.

Modifications of Leaves.—Leaves exist in other forms than the typical ones of foliage. Scales, such as those which envelop and protect buds in winter, and the seeds in cones, are leaves of simple structure which have no assimilative powers or functions; they most frequently originate from an enlarged leaf-base upon which a proper leaf never develops. Bracteal leaves, or bracts, are of similar character, and grow beneath and about the flowers, of which, when they are colored, they often form the most conspicuous part; but frequently they are green and are connected with true leaves by intermediate forms. Both scales and bracts have been forced, under experimental conditions, to develop into true leaves.

The modified leaves which form the flowers of phanerogams are termed "floral leaves," and,

as has been said, typically succeed one another in whorls from below upward, as sepals, petals, stamens and carpels. The sepals are usually green and much like foliage-leaves; the sepals often retain a likeness, but the interior whorls usually bear no resemblance to leaves, yet occasionally, in ill-health, revert to a shape which betrays their origin and genetic history.

Periodicity of Leaf Growth.—Leaves are a temporary part of the plant, arising and disappearing at more or less regular intervals, usually once a year. This is especially noticeable in the higher plants, some of which (annuals) die in autumn completely, surviving as species only in their seeds; others die down to the roots in the fall and put forth entirely new stems as well as leaves the following spring; while others, as shrubs and tree, die only so far as their leaves are concerned, putting forth new foliage after the stated period of rest. This period is due to the arrival of annually recurring unfavorable conditions of temperature or moisture or both, when the activity of life in the plant is suspended and it ceases to feed or grow. In such a state leaves having no function are needless—in fact often harmful—and in many cases die and fall off in so sudden and conspicuous a manner that we say such trees are deciduous; while others, which we call evergreen, retain most of their leaves in a green condition until gradually replaced by new ones, so that the foliage seems to be perpetual. The brilliant colors of the dying leaves of many trees and herbs in autumn are due partly to chemical changes in the decaying chlorophyll, and partly to the exposure of pigment cells previously concealed by the abundance of chlorophyll and other features of vital activity. The leaf drops because it no longer receives nourishment from the stem or twig. The cells at its base close up, transmitting no more sap, and in so doing separate from those in the base of the leaf, which is thus cut off and thrown away.

Bibliography.—The morphology, genesis, and functions of leaves have been studied most deeply by German students, as Haeckel, Fritz Müller, Göbel, Schwender, Marchlewski, Fisher, and others. These and other authorities have been well summarized in the English translation by Porter of Strasburger's "Text-book of Botany" (1903). For the forms and nomenclature of leaves, see the botanical manuals and text-books of Gray, Wood, and other American authors.

ERNEST INGERSOLL.

Leaves of Grass, a collection of fleshy poems by Walt Whitman (q.v.) published in 1855.

Leavitt, lē'vít, Joshua, American editor: b. Heath, Mass., 8 Sept. 1794; d. Brooklyn, N. Y., 16 Jan. 1873. He was graduated at Yale College in 1814 and was admitted to the bar in 1819. In 1825 he graduated at Yale Divinity School and in 1831 became editor of the New York "Evangelist." He was an active member of American Anti-Slavery Society in 1833, and from 1837 to 1840 was editor of the society's journal, "The Emancipator." He was an active promoter of the "Liberty" and "Free Soil" parties. In 1848 he became one of the editors of the "Independent," retaining a position here until his death. He compiled "The Christian Lyre" (1834).

LEBANON

Lebanon, lēb'a-nón, Ind., city, county-seat of Boone County; on the Chicago & S. and the Cleveland, C., C. & St. L. R.R.'s; about 30 miles northwest of Indianapolis. The first permanent settlement was made in 1824, and the city was chartered in 1875. Its chief industrial establishments are flour and lumber mills, grain elevators, novelty works, and a natural-gas plant. The government is vested in a mayor, whose term of office is four years, and a council. The waterworks are owned and operated by the city. Pop. (1900) 4,465.

Lebanon, Ky., city, county-seat of Marion County; on the Louisville & N. railroad; about 52 miles southwest of Lexington, the capital of the State, and 70 miles south of Louisville. It is situated in an agricultural region, and is the trade centre for an extensive section. The chief manufactures are flour, meal, whiskey, furniture, wagons and carriages. A large amount of live-stock is shipped from Lebanon. It is the seat of Saint Augustine's Academy, under the auspices of the Roman Catholic Church, and of a public and parish high school and good graded schools. Several churches, and the city and county buildings are among the prominent buildings. The city owns and operates the waterworks. Pop. (1900) 3,043.

Lebanon, Mo., city, county-seat of Laclede County; on the Saint Louis & S. F. railroad; about 55 miles northeast of Springfield, the capital of the State. It is situated in an agricultural region and is the trade centre for a large extent of country. Its chief manufactures are flour, machine-shop products, lumber, bricks, and dairy products. Its trade is principally in the manufactured products, live-stock, fruit, hay, and vegetables. The city is a well known health resort because of its mineral springs. Pop. (1900) 2,125.

Lebanon, N. H., town, one of the county-seats of Grafton County; on the Mascoma River, a few miles from its junction with the Connecticut River; and on the Boston & M. railroad. It is about 68 miles northwest of Concord, the capital of the State. It was settled about 1762, by people from the vicinity of Lebanon, Conn., who named their new home after the Connecticut town. It is situated in an agricultural region, but the extensive water-power supplied by the Mascoma River has made it an important manufacturing town. The chief manufactures are woolen goods, machinery, agricultural implements, wooden ware, men's clothing, sash, doors, and blinds, snow-shovels, flour, dairy products, and lumber. It has large brick-yards and granite-works. Over 1,000 persons are employed in the manufactories. The annual town-meeting is still the governing power. Pop. (1900) 4,965.

Lebanon, Ohio, village, county-seat of Warren County; on the Dayton, L. & C. and the Cincinnati, L. & N. R.R.'s; about 73 miles southwest of Columbus and 25 miles northeast of Cincinnati. It was laid out as a village in 1802. It is situated in an agricultural region and its industries are connected with farm products. It is the seat of the National Normal University, a private institution, which in 1903 had in attendance nearly 3,000 pupils. The Mechanics' Institute Library has about 5,000 volumes. There is one

orphan asylum. The city owns and operates the electric-light plant and the waterworks. Pop. (1900) 2,867.

Lebanon, Pa., city, county-seat of Lebanon County; on the Cornwall & L. and the Philadelphia & R. R.R.'s; about 66 miles northwest of Philadelphia and 23 miles northeast of Harrisburg. Lebanon was settled as early as 1700 by German emigrants. The borough of Lebanon was laid out by George Steitz, in 1750, and was first called Steitztown. It was incorporated in 1820 and chartered as a city in 1885. It is situated in the Lebanon Valley, noted for the fertility of its soil; but the largest part of the wealth of the city comes from the quarries and mines of the vicinity. The Cornwall iron mines, about five miles distant from the city, the limestone and brownstone at the base of the mountains, the brick-clay, the iron ore, all contribute to the industrial wealth of Lebanon. Its chief industrial establishments are furnaces and foundries, rolling-mills, steel-plants, machine-shops, a very large nut and bolt works, chain-works, a creamery, employing a total of about 10,000 persons.

The educational institutions are the public and parish schools, the Lebanon Business College, the School of Telegraphy, and four libraries. It has a large number of churches. Some of the prominent public buildings are the courthouse, county-house, and post-office. There are six banks with a combined capital of \$700,000. The annual business amounts to over \$10,000,000. The predominating nationalities are, in order of numbers: American (a large majority), Irish, Germans, Hungarians, Italians, and a few Chinese. Pop. (1890) 14,664; (1900) 17,628.

JOHN W. HARESON,
Ex-Mayor.

Lebanon, Tenn., town, county-seat of Wilson County; on the Nashville, C. & St. L. railroad; about 35 miles east of Nashville. It is situated in an agricultural region, and its trade and industries are connected with farming products. It ships large quantities of hay, butter, and poultry. It is the seat of Lebanon College for Young Women, and of Cumberland University, founded in 1842 by the Cumberland Presbyterians. Pop. (1900) 1,956.

Lebanon, Cedars of. See CEDAR.

Lebanon, Mountains of, Syria, two nearly parallel mountain ranges which, commencing at about lat. $34^{\circ} 25'$ N., stretch south-southwest toward Palestine, enclosing between them a valley about 70 miles long by 15 miles wide, now simply distinguished by the name of El-Bukaa, "the valley," but known anciently by the name of Coel-Syria. To distinguish the two ranges that on the west is called Lebanon, and that on the east Anti-Lebanon; the Arabs, call the former Jebel-Libnan, and the latter Jebel-esh-Shurky. Lebanon, which runs almost parallel to the Mediterranean coast, and at no great distance from it, may be considered as terminating near the coast, a little north of the mouth of the Litani, between Tyre and Sidon. It is the loftier range of the two, and presents almost a continuous ridge without any marked break. Its loftiest summit—Dhor-el-Khodih, in the north, has a height as given by barometer of 10,060 feet. Anti-Lebanon has a much lower average height, and the culminating point of this

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chain Jebel-esh-Sheikh, situated west-southwest from Damascus, has a height stated to be about 9,000 feet. The prevailing rock of Lebanon is limestone, of a whitish color; and from this its name, which means "white," is supposed to be derived, though others ascribe it to the snows which cover it. The loftiest summits of Lebanon, presenting lofty precipices and wild narrow gorges, are almost absolutely barren; but at some distance below, vegetation makes its appearance, the pastures become verdant, and, by means of artificial terraces, cultivation is successfully carried on upon rugged slopes where it would otherwise be impossible. The habitable districts are occupied toward the north by the Maronite Christians, a hardy and industrious race, and toward the south by the warlike Druses. Numerous villages and convents are to be seen on the sides and summits of the cliffs. The forests of cedar for which Lebanon was anciently celebrated are represented by a few groves on Lebanon, there being none now on Anti-Lebanon. (See CEDAR.) The other prevailing forest trees are firs and oaks. The vine is largely cultivated, and olive, fig, and mulberry trees abound. Considerable numbers of wild beasts, as the jackal, hyena, wolf, bear, and panther, inhabit the glens and higher peaks.

Lebanon Springs, N. Y., village, in the northeastern part of Columbia County; on the Lebanon Springs railroad; about 25 miles southeast of Albany. It is in a fertile agricultural region, and is a favorite health resort because of its mineral springs. A community of Shakers (q.v.) who live in the village and vicinity make brooms and baskets, and cultivate extensive gardens. They sell considerable garden seed. Pop. of the town 3,000; of the village 700.

Lebanon Valley College, a coeducational institution, founded, in 1867, at Annville, Pa. It is under the auspices of the United Brethren. The college has five courses which lead to the degree of Bachelor of Arts; and normal, art, music, and preparatory departments. It has 15 scholarships, and the productive fund, in 1903, was about \$162,000; the income from the productive fund and the tuitions was in 1902, \$15,442. In 1903 there were connected with the school 29 professors and instructors, and 460 students.

Le Bas, Philippe, fé-lép lē-bā, French historian and archæologist: b. Paris 17 June 1794; d. there 1861. At 16 he entered the navy, which he left three years later for the army and he shared in the campaigns of 1813-14. In 1820 he was chosen by Queen Hortense to act as tutor to Prince Louis Napoleon, now Napoleon III., with whom he remained until October 1827. After holding professorships at Paris successively of history and of the Greek language and literature, he was commissioned in 1842 by the French government to undertake a tour of archæological investigation in Greece and Asia Minor, during which he made many valuable discoveries. He published books on very varied subjects, embracing essays on classical inscriptions, editions of ancient authors, travels, ancient and mediæval history, politics, instruction in German, and translations from German and English. His best known works are his 'Explication des Inscriptions Grecques et Latines recueillées en Grèce' (1835-7), and 'Voyage

archéologique en Grèce et en Asie Mineure' (1847 et seq.).

Lebaudy Airship, The, a remarkable invention of M. Lebaudy, of Paris, France; an airship of the balloon type which is asymmetrical in form, its midship frame being situated slightly toward the front. The total length is 190.24 feet. The midship frame is situated at 81.67 feet from the prow and 108.57 from the stern. The extreme diameter of the balloon is 32.14 feet. With respect to the length of 190.24 feet we have thus an elongation of 5.6 diameters. In the entire median part of the section of the fusiform bag is not a complete circle, but a segment limited by a chord at its lower part. This means that the balloon presents a flat portion fixed to a linen-covered plane and held by a rigid frame which is attached to the side of the bag and, on the other hand, supports the suspension. The surface of the bag is about 13,000 square feet. Its weight, stitching included, is about 880 pounds. The car has the form of a flat-bottomed pontoon with pointed extremities. It is 15.75 feet in length, 5.25 in width, and 3.28 in depth. It is formed of a metallic frame. The motive power is furnished by a 40-horse-power motor cooled by a circulation of water and a radiator. The gasoline tank is placed beneath the car and the motor, as a measure of precaution against fire. A little compressed air is sent to it by means of a bicycle pump for feeding during the setting in operation. The exhaust pressure afterward suffices. The motor uses 30.8 pounds of gasoline per hour, say about 6 fluid ounces per horse-power. The motor actuates two double-bladed propellers arranged on each side of the car at the extremities of a hollow horizontal journal, in the interior of which revolves the driving shaft. The transmission to the propellers is effected through the intermediate of bevel wheels protected by casings. The most remarkable flight of the Lebaudy airship was made 12 Nov. 1903, and will no doubt mark a date in the annals of aerial navigation. The airship covered about 38 miles in 1 hour 41 minutes, and came back to the starting point. After passing over the Seine region to the west of Paris it crossed the Forest of Saint Germain, then entered the city by way of the Bois de Boulogne. The airship was then headed direct for the Eiffel Tower, which it reached, and landed just behind it, carrying out the original intention. At the start the operator had 640 pounds of ballast, and threw out 286 during the trip. The maximum altitude reached was 1,000 feet, and the mean 330 feet. As to the speed the airship made on this trip, it was reckoned at 22.4 miles an hour. See also BALLOON; FLYING MACHINE.

Lebel, Nicolas, French soldier and inventor: b. Angers 18 Aug. 1835; d. Vitre, Ille-et-Vilaine, 6 June 1891. He entered the Military School of Saint Cyr in 1855, served as captain in the Northern Army during the campaign of 1870, and became director of the Musketry School at Tours, and in 1883 at Chalons. The same year he was appointed member of the commission on securing an improved rifle for the infantry. The commission decided in favor of the small-bore rifle offered by Lebel, and known as the "fusil Lebel," which was introduced into the French army in 1886. He was

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present as colonel at the battle of Sedan, but sickness cut short his military career, and in 1800 he was placed on the retired list. He was subsequently put in charge of the Inland Revenue Department at Vitre.

Leblanc, Nicolas, French chemist: b. Issoudun, department of Indre, 1766; d. 16 Jan. 1806. He studied medicine, was appointed surgeon to the Duke of Orleans and, after the Revolution, administrator of the department of the Seine. His name is associated with the process of converting common salt into carbonate of soda, a matter to which he turned his attention in 1786, when the Academy offered a prize of 2,400 livres for the discovery. His first endeavors did not yield a decisive result, but led to an accidental discovery by Dizé, an assistant of Jean Darct (q.v.) at the College of France, through which success was attained. With the Duke of Orleans and another, Leblanc and Dizé formed a partnership and began to make soda. The Revolution wrecked their enterprise. Despite his patent, secured in 1791, Leblanc was compelled by the committee of public safety to disclose the secret of the process, and the manufacture became open to all. After years of poverty and fruitless efforts for redress, he committed suicide. The discovery of the essential features of the process was assigned to him in 1855 by a commission of the Academy, although the claim of Dizé was strongly advocated. As to the value of the process itself there is no doubt. It has made soda cheap, thereby facilitating the manufacture of soap, the cleansing and bleaching of cloth, etc.; has promoted the manufacture of sulphuric acid, and thereby the utilization of metallic sulphides; and has originated the manufacture of chlorine and of bleaching-powder. The Leblanc soda-process is still in extensive use, but is now dependent more on its by-products than on its output of soda. One half of the world's soda is now made by the ammonia-soda or Solvay process. See Soda.

Lebrun, Charles, French painter: b. Paris 24 Feb. 1619; d. there 12 Feb. 1690. He was the son of a sculptor, but early turned his attention to painting and became the pupil of P. Perrier and S. Vouet. He was especially attracted by the Italian masters, examples of which he copied in the gallery at Fontainebleau so that in his fifteenth year his works won the patronage of Cardinal Richelieu. Chancellor Seguier provided means for him to visit Rome and during his residence there (1642-6) he studied under Poussin, at the same time paying much attention to the antique, and the paintings of the early masters. In 1646 he returned to France, and assisted in founding the Royal Academy of Arts and Sciences, in which he became professor, chancellor, and in 1683 director. He was also director of the Gobelins tapestry manufactory. In 1662 Louis XIV. appointed him court painter, ennobled him and made him curator of his art collections. He was meanwhile engaged in decorating the Apollo gallery in the Louvre. In 1668 the king appointed him superintendent of works in the building of Saint Germain. He also decorated with paintings the royal chateau at Sceaux, and designed the statues and fountains for the park, etc. In 1679 he undertook his greatest work, the interior

decoration of the palace at Versailles, and in the Great Gallery portrayed the achievements of Louis XIV. Very many paintings of his are still to be seen in the Louvre. His works are characterized by abundant invention and facility of execution; they reflect the spirit of the contemporary Italian school, but are marred by excessive straining after effect, flatness of design, and falsity of color-tone. His vast canvas, 'Portrait of the banker Jabech of Cologne and Family,' is in the Berlin Museum. He exercised a despotic influence over French art of his time. He wrote 'Traité sur la Physiognomie' and 'Méthode pour apprendre à dessiner les Passions.' Consult: Generay, 'Le Style Louis XIV.' (1885); and Jovin, 'Charles Lebrun, et les Arts sous Louis XIV.' (1890).

Lebrun, Charles François, shärl frän-swä lē-brü'ni, DUC DE PIACENZA, French administrator: b. St. Sauveur-Landelin 19 March 1739; d. near Dourdan 16 June 1824. He was appointed inspector of crown-lands, later entered the States-General and the Constituent Assembly, was appointed governor of Seine-et-Oise in 1791, sat in the council of Five Hundred, of which he was chosen president, and was made third consul by Bonaparte for services on the 18th Brumaire. In 1807 he reorganized the administration of the exchequer, and after a long retirement re-entered public life as governor of Holland in 1810. He translated the 'Iliad,' the 'Odyssey,' and the 'Jerusalem Delivered.' Consult his 'Memoirs' (1829).

Lebrun, Marie Louise Elisabeth, French painter: b. Paris 16 April 1755; d. there 30 March 1842. She was trained under Doyen, Joseph Vernet and Greutze and chose portrait painting as her specialty. She left a great number of portraits in oil and pastel. About 600 are identified as her works of which the most important are, her portrait of herself with her little daughter (in the Louvre); her portrait of herself in the Uffizi Gallery at Florence; Marie Antoinette with her three children (in the museum at Versailles). In 1783 she was elected a member of the Academy. During the French Revolution she took refuge in the various European capitals, where she painted portraits of the reigning princes, and members of their families; as well as of the most famous people of the time. Few works of hers are to be met with except in private collections. She published 'Souvenirs de ma Vie' (Paris 1837).

Le Brun, Napoleon Eugene Charles Henry, American architect: b. of French parents, Philadelphia 2 Jan. 1821; d. New York 9 July 1901. He was a pupil of Thomas U. Walter, the architect, and from 1842 to 1861 practised his profession in Philadelphia where his most notable work is the Roman Catholic cathedral in Logan Square. He removed to New York in 1861 and among structures there which were designed by him with his son, are the Foundling Asylum and the Metropolitan Life Insurance building in Madison Square.

Lebrun, Ponce Denis Ecouchard, pôns dĕ-nĕ à-koo-shär, called Lebrun-Pindare, French poet: b. Paris 11 Aug. 1729; d. there 2 Sept. 1807. His title 'Pindar' is due to the form and the mythological allusions of his odes, not to any large poetical merit, either in them or the lyrics; and as a satirist, he alternately groveled

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before and libeled the same men. His best odes are addressed to Buffon. He excelled in the composition of madrigals and epigrams; the latter relate for the most part to his quarrels with other authors.

Le Caron, Joseph, zhô-zéf lê kâ-rôñ, French missionary: d. 1632. He was a Franciscan, belonging to the congregation of Recolets. His work in Canada, which he reached in 1615, was chiefly among the Huron tribe, and he was the first European to explore the lake of that name. His indefatigable labors among the Indians met with scant success, though he left some valuable information concerning their language. After General Wolfe's capture of Quebec (1629) he was deported to England with others of the French population and never returned to the monastery which he had built in that city.

Lecce, ancient LYCIA, or LUPIA, southern Italy. The town is situated in the province of Lecce, on a plain between the Adriatic on the north, the Gulf of Taranto on the west, and the Ionian Sea on the south. It has many interesting edifices, especially churches and convents, some of which contain admirable works of art. At the gate of St. Biagio is a triumphal arch erected in commemoration of the entrance of Charles V. There is a public library and there are well-established day and evening schools and numerous charitable institutions. Lecce was very flourishing during the Roman period, escaped the barbarians, and in 1000 A.D. was governed by its own counts. Pop. 23,000.

Lecco, lëk'kô, Lake of (It. *Lago di Lecco*), the name given to the southeastern arm of Lake Como in Italy. Some of the large streams of the northern part of Italy flow into Lake Lecco. The town of Lecco and many pretty villages are on its shores.

Lech, lëch, a river which has its rise in the Alps, in Vorarlberg, in Switzerland, flows east and north until it enters Bavaria, after which its course is almost directly north to Donauwörth where it unites with the Danube. Its length is nearly 200 miles. It is not a navigable stream but it has extensive water-power. On this river, near Rain, about five miles below Donauwörth, Tilly was defeated and killed, 5 April 1632, by a Swedish force under Gustavus Adolphus.

Leche, lë-chë, in zoology, the *Onotragus leche*, from South Africa. It is a water antelope, frequenting damp, marshy places, and taking to impassable swamps. It goes in considerable herds, and may be known by the peculiar way in which it allows its horns to recline, almost touching the withers.

Lechford, Thomas, American colonial lawyer: d. about 1645. He came to the Massachusetts Bay Colony in 1638 and was the earliest lawyer in Boston. He was regarded with great suspicion by the colonial authorities on account of his profession, and the nature of his religious opinions, and he found extreme difficulty in making a living. He therefore, in 1641, returned to England, where his book, 'Plain Dealing, or News from New England,' was printed in 1642. It is a valuable source of information respecting details of early colonial existence, and in 1644 was reprinted with the new title, 'New England's Advice to Old England.' A modern edition, annotated by J. H. Trumbull (q.v.), appeared in 1867.

Lecidea, in botany, the typical genus of the *Lecidinae*. The apothecia have a border colored like the disk. It is very extensive, and is found in a great variety of situations, and at every season of the year. *Lecidea geographica* is sometimes sulphur-yellow and sometimes yellowish-green. If a yellow specimen be suspended over a solution of carbonate of ammonia, it becomes covered with carmine-red globules, gradually loses its usnic acid, and then becomes grayish-white.

Lecithin, lë-cï-thin, in chemistry, a name applied to several phosphoretted fatty bodies, of very similar chemical and physical properties, derived from brain substance, nerves, blood, gall, the yolk of eggs, etc., and also from some vegetable substances (maize, etc.), and which appear as constant constituents of the cell substance of organized bodies. It is a viscous body, insoluble in water, slightly soluble in cold alcohol, but very soluble in boiling alcohol and in ether. From its saturated solution in alcohol, it crystallizes in radially-grouped needles, which dry up *in vacuo* to a white powder. It may also be crystallized from glacial acetic acid. Every lecithin is a fat containing only two fatty acid radicals, the third hydroxyl group being replaced by ethylen-trimethyl ammonic hydrate (neurine) in combination with phosphoric acid.

Lecky, lëk'i, William Edward Hartpole, English historian: b. Newtown Park, near Dublin, 26 March 1838; d. London 23 Oct. 1903. He was educated at Cheltenham College, and at Trinity College, Dublin, whence he was graduated in 1859, and in 1861 published anonymously his first work, 'Leaders of Public Opinion in Ireland,' dealing with Swift, Flood, Grattan, and O'Connell, which appeared under his name in a new edition in 1871. An important 'History of the Rise and Influence of the Spirit of Rationalism in Europe' followed in 1861-5 and ensured him wide reputation as scholar and thinker. His 'History of European Morals from Augustus to Charlemagne' (1869) displayed a profound knowledge though its conclusions were not always sound. His most elaborate and valuable work is a 'History of England in the Eighteenth Century' (Vols. I.-II., 1878; III.-IV., 1882; V.-VI., 1887; VII.-VIII., 1890), in which he treats very fully of Irish affairs to the time of the Addington ministry. In a new edition of this history, published in 12 volumes in 1893, the chapters on Ireland were removed from their original context and arranged in a continuous narrative occupying the last five volumes. This work is in reality a history of civilization for the period covered; treating of the forces contributed to the making of 19th century England, whether of native or of foreign origin. Lecky's other works are: 'Poems' (1891); 'Democracy and Liberty' (1896), in which he arraigns modern British political life, and makes some comments upon Gladstone which once aroused considerable discussion; and 'The Map of Life: Conduct and Character' (1899). In 1895 he was elected to the House of Commons as member for the University of Dublin, and in 1897 was sworn of the Privy Council. In politics he was at first a Liberal and from 1886 a Liberal-Unionist with an undisguised aversion to democratic government. He became

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corresponding member of the Institute of France in 1894, and an honorary member of the Royal English Academy upon its organization.

Leclaire, Edmé-Jean, ēd-mā-zhō̄n lē-klär, French social scientist: b. Aisy-sur-Armancourt 14 May 1801; d. Herblay 10 Aug. 1872. At first a farm-worker, then apprentice to a mason, he afterward apprenticed himself to a house-painter in Paris, and in 1827 began the painting business on his own account. He proved remarkably successful, and soon took a leading position in his trade. In 1835 the principle of profit-sharing (q.v.) was proposed to him, and in 1842 he began to put it in practice in his own establishment, dividing the amount available in sums proportioned to yearly wages. A mutual-aid society which he formed in 1838 and reorganized in 1853 sustained itself from the latter year on the profits which were shared among the members. In 1864 the right to a division of the funds of the society was superseded by a system of retiring pensions. Leclaire was elected maire of Herblay in 1865. In the company which he founded his plan of distribution is still adhered to with continued success.

Leclaire, le-klär', Ill., village, in Madison County, adjoining Edwardsville, the county-seat and post-office; on the Toledo, St. L. & W., the Chicago, P. & St. L., and a spur of the Wabash R.R.'s; 18 miles northeast of St. Louis. It contains the factories of the Nelson Manufacturing Company, the residences of its officers, of a number of the employees, and of some others. The village was founded by the Nelson Manufacturing Company, which, in 1886, adopted what is known as the "profit-sharing plan,"—dividing the profits of the business with the employees. After testing this plan, it was decided that more and better service could be rendered to the employees by providing good homes and social and educational facilities, than by simply paying a contingent increase in wages. In 1890 the company acquired 125 acres of high, rich, gently undulating corn land, well adapted to growing everything from blue-grass to watermelons. The tract abuts on the railroads mentioned. Coal underlies the land and there are coal-fields nearby. About 10 acres are reserved for factory purposes, 10 for a campus and other public uses, and the remainder for homes and farming use. All of the improvements, industrial, educational, and the buildings for homes, were started simultaneously. The manufacturing establishments are (1903) five factory buildings, a power-house, a dry-house, and some miscellaneous buildings, all made of brick. There are about 250 employees, who are engaged in making plumbing goods of iron, brass, wood, and marble; all of which goods are made from the raw product up to the finished article. None of what is called "raw material" is manufactured here. Adjoining the factory acres are first the bowling alley and the billiard room, then the ball grounds, next the school-house, the lecture and dancing-hall, and a skating lake. There are winding roads made of cinders, kept smooth, sprinkled in summer, never dusty and never muddy. These roads are bordered by concrete and board sidewalks and trees. The houses built for the employees by the company may be purchased and, if desired, paid for in installments about equal to city rents. The houses are mostly three to six rooms, and are built on lots with from 50 to

100 feet frontage, by 140 to 180 feet depths. They have well-kept lawns, flower beds, shade trees, fruit trees, and gardens.

There is no political organization in Leclaire; all are subject only to the State laws. There are no rules, no "Don't" signs, no boss. No case of disorder has yet (1903) occurred. There are no saloons. The church needs are supplied by Edwardsville. There has always been a kindergarten, and an "Industrial School" has been founded, wherein the pupils work half the time at productive labor and study the other half. The pupils living at home are not obliged to work. Those from a distance get their tuition and living free; they learn how to work and acquire a trade at the same time that they learn from books and capable teachers. No examination is required for entrance. The school is prepared to teach all from the lowest to the highest grade, and the pupils are promoted as rapidly as the results of their work merit. The work in the school consists of house building, farming, and varied factory work. Whenever a pupil becomes sufficiently proficient to earn, at the regular value of his work, more than the cost of his schooling and living expenses, he is paid the excess in money. The intention is to civilize work, to take it out of the category of drudgery and put it in the list of arts and crafts, to make the pupils intelligent workmen and skilled craftsmen. In this school there is a weekly lecture on hygiene, given by an experienced, broad-minded physician. The village has a free library, and each winter a course of lectures is given, two each month, with occasional musicales. A singing school is held one night each week, and a bowling party for the school and the children also one night a week, and occasionally excursions to St. Louis. In the summer there are excursions from St. Louis to Leclaire, sometimes entire train-loads of children for a day's outing. Leclaire is founded and built on simple lines; the complex and strenuous are avoided, good-will, simplicity, and the domestic enjoyments are fostered.

N. O. NELSON,
Leclaire, Ill.

Le Clear, Thomas, American painter: b. Owego, N. Y., 1818; d. New York 1882. He painted portraits in London, Canada, before he had received any instruction in art, and left that place about 1832 for New York, where he made his principal residence. He was elected a national academician in 1863. Besides his portraits, which are clever in characterization and full of life and expression, he has painted many genres, such as 'Marble Players'; 'The Itinerant' (1862); and 'Young America.' Among his portraits are those of 'William Page' in the Corcoran Gallery at Washington; and 'George Bancroft' in the Century Club, New York.

Le Clerc, lē-klär, John, or Johannes Clericus, Swiss theologian: b. Geneva, Switzerland, 19 March 1657; d. Amsterdam, Netherlands, 8 Jan. 1736. He began to study theology and philosophy in his native town, and continued his studies at Grenoble, Saumur, Paris, and London. He gradually adopted the views of the Remonstrants, as the adherents of Arminius (q.v.) were then called. In 1684 he was appointed to the faculty of the Remonstrant College at Amsterdam; but in 1728 a stroke of

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apoplexy deprived him of his power of speech, which he never recovered. His influence has been most widely felt through his writings, which are voluminous. He edited the 'Apostolic Fathers of Cotelarius' (1698), and the views he held about Mosaic authorship, inspiration and kindred topics seemed to anticipate some recent deductions from the Higher Criticism. Besides a Bible commentary he published: 'Bibliothèque universelle et historique' (25 vols. 1686-93); 'Bibliothèque choisie' (28 vols. 1703-13); and 'Bibliothèque ancienne et moderne' (29 vols. 1714-26).

Le Clerc, Sébastien. See CLERC, SÉBASTIEN LE.

Le Clerq, Chrétien, krā-tē-ōn lē klär, French missionary: b. Artois, France, about 1630; d. Lens, France, about 1695. He labored for six years on the Island of Gaspé as a Recollet missionary with others of his order (1651-61), and then built a house for the Recollets in Montreal with money collected in France. After resuming his unsuccessful missionary work at Gaspé he returned to France. His works are interesting as throwing a side light upon early Canadian history, but are tinged with ecclesiastical partiality for Frontenac, who favored the Recollets at the expense of the Jesuits. These works are: 'Nouvelle Relation de la Gaspésie' (1691); and 'Establishment of the Faith in New France' (English translation by John G. Shea 1881).

Lecocq, lē-kök, Alexander Charles, French composer: b. Paris 3 June 1832. He received his musical education in the Conservatory of the Capital, under Bazin and Halévy, and the earliest of his operas to appear was 'Le Docteur Miracle,' which had won the first Offenbach prize. His operetta 'Fleur de Thé' gained him the widest recognition. In this as in his later productions he followed the advice he had received from Offenbach, that the operetta should be elevated into a work of art. His principal operettas are: 'Les Jumeaux de Bergame' (1868); 'Gandolfo' (1869); 'Le beau Duncio' (1870); 'La Fille de Madame Angot' (1872); 'Girofle Girofia' (1874); 'La petite Mariée' (1875); 'Kosiki' (1876); 'Le Dompteur' (1877); 'Le petit Duc' (1878); 'La Rousette' (1881); 'Plutus' (1886); etc. They are 42 in number, and have attained the most remarkable popularity in France and elsewhere.

Lecompton, Kans., city, in Douglas County; on the Kansas River, and on the Atchison, T. & S. Fe railroad; about 15 miles east of Topeka. It was settled in 1854 by sympathizers with the slavery side of the question which was then before the people, in relation to the admission of new States. Lecompton was the headquarters of the pro-slavery men, and it was here that the Lecompton Constitution (q.v.) was framed, in the fall of 1857. The Lane University was founded here in 1865. The place was named in honor of Judge S. D. Lecomte, one of the early workers in Kansas. Pop. 500.

Lecompton Constitution, in Kansas history a form of territorial government, adopted by a convention held at Lecompton, Kan., in 1857, the legality of which in both form and action became a matter of dispute, and caused national discussion and congressional action. For several years prior to 1857 the slave question

had agitated the territory, and numerous bloody quarrels between the Free State settlers and the Missourians who came across the border into Kansas, added fuel to the strife. In June 1857 the territorial legislature, composed entirely of pro-slavery men, chosen at an election at which the free-state men had declined to participate on the ground of its illegality, met at Lecompton, and among other acts passed one providing for the election of a convention to frame a State constitution for Kansas. Meanwhile Congress had passed a bill declaring void all the enactments of the Kansas legislature on the ground that they were cruel and oppressive. The election for delegates to the constitutional convention was held 15 June, but the free-state men took no part in it. Only 2,000 votes were cast, while the legal voters in the territory numbered 10,000. The constitutional convention met at Lecompton in November and adopted a constitution, four sections of which related to slavery, declaring the rights of owners to their slaves to be inviolable, and prohibiting the legislature from passing acts of emancipation. This provision alone was to be submitted to the people at an election to be held 21 December. The ballots cast were to be endorsed: "Constitution with slavery," or "Constitution with no slavery," thus securing in any event the adoption of a constitution, several clauses of which, besides those submitted, were highly objectionable to a majority of the people. A provision was inserted preventing any amendment to the constitution previous to 1864. The promulgation of this constitution caused great excitement in Kansas.

At the election 21 December, the vote returned was 6,143, more than one half of which was from the counties along the Missouri border, whose total number of voters by the census did not exceed 1,000. Against the slavery clause there were but 569 votes, the free-state men generally abstaining from voting. The constitution being thus nominally adopted, an election for officers under it was to be held 4 January. At a special session the legislature passed an act submitting the Lecompton constitution to the direct vote of the people on the same day with the State election, and the result was 10,226 votes against it. Congress after a long discussion referred the matter to the people of Kansas at an election on 3 Aug. 1858, when the Lecompton constitution was again rejected by 10,000 majority. Meanwhile the territorial legislature had called another convention to meet in April to frame a new constitution, which was submitted to the people and ratified by a large majority, though by a small total vote. The territorial legislature met in January 1859 and passed an act submitting to the people the question of calling still another constitutional convention. Delegates were elected, and at a convention which met from 5 July to 27 July a constitution was finally adopted which prohibited slavery. This was ratified by a majority of 4,000 at the election 4 October, and the slavery question was at last settled and Kansas was admitted to the Union as a State 29 Jan. 1861. See also KANSAS; SLAVERY.

Lecomte Du Nouy, Jules Jean Antoine, zhü'l zhö'n äñ-twän lē kônt dü noo-ë, French artist: b. Paris 10 June 1842. A pupil of Gleyre, Gérôme, and Signol at the Ecole des Beaux Arts, he won there the second Prix de Rome in 1865,

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and was afterward an annual exhibitor at the Salon. Among his canvases, somewhat dull in color but admirably correct in drawing and archaeological exactness, are: 'The Sorcerer'; 'Bearers of Evil News before Pharaoh'; 'Job and his Friends'; 'The Madness of Ajax'; and a portrait of Béranger.

Le Conte, lē kōnt, John, American physicist: b. Liberty County, Ga., 4 Dec. 1818; d. Berkeley, Cal., 29 April 1891. He was a son of Lewis Le Conte (q.v.). He was graduated from Franklin College in 1838, from the College of Physicians and Surgeons, New York, in 1841; in 1846-55 was professor of natural philosophy and chemistry in Franklin College; in 1856-69 was professor of natural and mechanical philosophy in South Carolina College; in 1869 became professor of physics and industrial mechanics in the University of California; was president of the university in 1876-81; and in 1881 again assumed his professional duties. Among his publications were: 'The Philosophy of Medicine' (1849); and 'The Study of the Physical Sciences' (1858).

Le Conte, John Eaton, American naturalist: b. near Shrewsbury, N. J., 22 Feb. 1784; d. Philadelphia 21 Nov. 1860. He was a brother of Lewis Le Conte (q.v.). In 1813 he entered the army as a topographical engineer, and in 1831 was retired with the grade of major. He published 'Monographs of North American Species of Utricularia, Gratiola, and Ruellia,' and other studies in natural history.

Le Conte, John Lawrence, American entomologist: b. New York 13 May 1825; d. Philadelphia 15 Nov. 1883. He was a nephew of Lewis Le Conte (q.v.). He was graduated from Mount St. Mary's College (Emmitsburg, Md.) in 1842, from the College of Physicians and Surgeons in 1846, became a surgeon of volunteers in the Federal army in 1862, and was later made medical inspector United States army, with rank of lieutenant-colonel. In 1873 he was chosen to the presidency of the American Association for the Advancement of Science. He was generally recognized as an important authority on entomology; and published on that subject: 'Classification of the Coleoptera of North America' (1862-73); 'List of the Coleoptera of North America' (1866); and 'New Species of North American Coleoptera' (1866-73).

Le Conte, Joseph, American geologist: b. Liberty County, Ga., 26 Feb. 1823; d. Yosemite Valley, Cal., 6 July 1901. He was a son of Lewis Le Conte (q.v.). He was graduated from Franklin College, Georgia, in 1841, from the College of Physicians and Surgeons, New York, in 1845; practised medicine at Macon, Ga.: in 1850 became a pupil of Louis Agassiz, whom he accompanied on an expedition to Florida; and later was professor of natural science in Oglethorpe University, Georgia, and of natural history in Franklin College. In 1856-69 he was professor of chemistry and geology in the University of South Carolina, and from 1869 until his death held the chair of geology in the University of California. During the Civil War he was chemist in the Confederate medicine laboratory and later in the nitre and mining bureau at Columbia, S. C. He was vice-president of the International Geological Congress in 1891, and president of the American Associa-

tion for the Advancement of Science in 1892. His contributions to geology include the determination of the character and age of the Cascade range; the description of the ancient glaciers of the Sierra Nevada; the development of what is called the "contractional theory" in mountain building; and researches in vein formation. He wrote also on optics, philosophy, biology, and other subjects. He was an editor of the 'Journal of Geology and of Science,' and published: 'Religion and Science' (1873), a collection of lectures; 'Elements of Geology' (1878), his best known book; a 'Compend of Geology' (1884); 'Evolution: Its Nature, its Evidences, and its Relation to Religious Thought' (1887); and other writings. Consult his 'Autobiography,' edited by W. D. Armes (1903).

Le Conte, Lewis, American naturalist: b. near Shrewsbury, N. J., 4 Aug. 1782; d. Liberty County, Ga., 9 Jan. 1838. He was graduated from Columbia in 1799, studied medicine, on his plantation of Woodmanston, Ga., established a botanical garden, particularly rich in bulbous plants of the Cape of Good Hope, and a chemical laboratory where he conducted numerous researches. He published nothing, but was of admitted aid to many botanists in their labors.

Leconte de Lisle, Charles Marie René, shär'l mä-rē re-nā lē kōnt dē lēl, French poet: b. Saint Paul, Ile de Bourbon (now Réunion), 23 Oct. 1818; d. Louveciennes 17 July 1894. When a young man he went to France, studied law at Rennes, and after a course of travel settled in Paris. His progress was slow, but gradually he gathered a group of young writers, and expanded his own work, whereby he won recognition as leader of the modern Parnassian school of poetry. It was some years before he found a publisher for 'Poèmes antiques' (1852), his first volume of real significance, but with 'Poèmes barbares' (1862) he gained an academic prize of 10,000 francs. In 1884 he published 'Poèmes tragiques,' and in 1885 appeared 'Derniers Poèmes,' a posthumous volume containing also critiques on his precursors in lyric poetry. His hand gave its impress to 'Le Parnasse contemporain,' a series of volumes published in 1866, 1869, and 1876, which is representative of his school, and in these some of his own most notable work was first seen. He also rendered valuable service to French literature by his superior translations of the 'Iliad' (1867), Hesiod (1869), the 'Orphic Hymns' (1869), the 'Odyssey' (1870), Horace (1873), Sophocles (1877), and Euripides (1885). In imitation of the Greek he wrote the dramas 'Les Erinnyses' (1872) and 'L'Apollonide,' based on the 'Ion' of Euripides. His poetry embodies a philosophy of human life in which he sought to combine art with scientific principles and to weave in one poetic fabric the mythical past with ideal visions yet to be realized by the race. In 1887 he was elected a member of the Academy.

Lecouvreur, lē-koo-vrē, Adrienne, French actress: b. Lamery, Champagne, 5 April 1692; d. Paris 20 March 1730. Arriving at Paris in her tenth year she made her first theatrical venture three years later, and was immediately engaged for the theatre at Lille. For the following ten years she was "on the road" as member of various traveling companies, but in

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1717 was called to the ‘Comédie Française,’ and made her début as Electra in Crebillon’s tragedy. Her simple and natural impersonation made a deep impression on the most fastidious of audiences, and from that time she played the rôle of most of the heroines in Corneille and Racine with such success that she was welcomed into the most aristocratic circles of the city and was drawn into correspondence with some of the most intellectual men and women of the day, among whom was Voltaire. During the last ten years of her life she counted among her admirers Maurice of Saxony, Voltaire and Lord Peterborough. She perished by poison administered by the Duchesse de Bouillon, a jealous rival. This dénouement is the subject of the play ‘Adrienne Lecouvreur,’ by Scribe and Legouvé. Consult: Mouval, ‘*Lettres d’Adrienne Lecouvreur*’ (1892).

Le Creusot, France. See **CREUSOT, LE**.

Lec’tern, or **Lettern**, the reading-desk or stand on which the larger books used in the services of a church are placed. The most ancient lecterns were made of wood, and elaborately carved. Modern ones have been made of marble or brass, very ornamental in design and of excellent execution. They are sometimes made in the form of an eagle, the outspread wings of which form the support for the volume.

Lectionary, lēk’shōn-ā-rī (Lat. *lectionarium*) originally, a service-book of the church of the Middle Ages, so termed as it contained the lessons (*lectiones*) or passages of Scriptures read in the church service. The Roman Catholic Lectionary contained the epistles and gospels of the Roman missal, sometimes also all the lessons of the various services in the church, in which case it was termed the Plenarium. The most ancient known, the Gallican Lectionary, is believed to represent the rite of the ancient Gallican Church. It was published from a manuscript of the monastery of Luxeuil in 1685, by Mabillon (q.v.), who attributed it to the 7th century. It was written in Merovingian characters, it names the festival of St. Geneviève, and assigns three lessons to each mass, in accordance with the ancient Gallican liturgy.

In the Greek Church the lectionaries consist of lessons from the Gospels, from the Acts and Epistles. The Greek lectionary is called *Synaxarion* (συναξάριον), and the oldest synaxarion extant is that prefixed to the Codex Cyprus (K), a manuscript of the New Testament which belongs to the 8th century.

The lectionary or calendar of the English Book of Common Prayer was first published in 1559, and contained two lessons, one from the Old Testament and one from the New for daily morning and evening prayer, and special lessons for Sundays and holidays. This lectionary was adopted by the Protestant Episcopal Church of the United States in 1789, but in 1833 the General Convention changed it by revision into the form which it now bears. In accordance with this assignment the Old Testament is appointed to be read through in the course of public worship once a year; the New Testament being read three times in the same period.

Lectister’niūm, among the ancient Romans, a sacrifice of the nature of a feast offered to the gods, an evident survival of the idea com-

mon in early stages of religious development that divinities actually partook of the offerings presented to them. On occasions of extraordinary solemnity, or in times of public calamity, the Greeks and Romans placed tables with food before images of the gods reclining on couches. According to Livy the first Roman lectisternium took place 354 B.C., when a terrible plague affected the cattle. These sacrificial feasts were of two kinds—ordinary, occurring almost daily, and extraordinary, occurring at intervals, and lasting from three to eight days, or longer.

Lector (reader), a minister of the church who reads the Bible, and other writings of a religious character, to the people. The order of lectors is the second of the minor orders in the Roman Catholic, the first in the Greek Church. The office is now merely looked upon as one of the steps to the priesthood, and only in the office for Good Friday does the missal recognize the functions of the lector. Lectors were consecrated by prayers and sometimes by laying on of the hands for this office; the candidate must have completed the seventh year of his age. They are mentioned by Justin Martyr in the 2d century, and appear to have been proper officers of the church in the 3d century. The orders in the Roman Catholic Church are bishop, priest, deacon, sub-deacon, acolyte, exorcist, reader, ostiarius or door-keeper. See ORDERS, HOLY.

Leda, lē’dā, in Greek mythology, the wife of the Spartan king Tyndareus. In order to enjoy her, Zeus changed himself into a swan, in which form he is represented with her in a picture from Herculaneum. By him she had Pollux and Helen, and by Tyndareus, Castor and Clytemnestra.

Leleganck, lēd-ē-gānk’, Karel Lodewyk, Flemish poet: b. Eecloo 9 Nov. 1805; d. Ghent 19 March 1847. He is one of the most popular of Flemish writers. His first collection of poems was ‘Flowers of my Springtide’ (1839). His poem on ‘The Three Sister Cities’—that is, Ghent, Bruges, Antwerp—is considered his finest production.

Ledochowski, Miecislas Halka, mē-ā-kēs-lās hāl’kā led-ō-hōv’skē, Polish Roman Catholic ecclesiastic: b. Galicia 29 Oct. 1822; d. Switzerland 28 July 1894. He studied theology and subsequently entered the papal diplomatic service and became papal auditor successively at Madrid, Lisbon, Rio de Janeiro, and Santiago de Chile. In 1861 he was appointed Archbishop of Thebes, while his appointment to the archbishopric of Gnesen and Posen in 1866 constituted him primate *ex officio* of Poland. He actively opposed the Prussian May laws by which Bismarck sought to subject the Roman Catholic Church in Germany to state control. In consequence of his opposition, his property was confiscated and himself imprisoned in 1873 for two years. He was made cardinal 15 March 1875, and in 1892 general prefect of the propaganda.

Ledru-Rollin, lē-drü-rȫl-lā̄, Alexandre Auguste, French political agitator: b. near Paris, France, 2 Feb. 1807; d. Fontenay-aux-Roses, France, 31 Dec. 1874. Admitted to the bar in 1830, he became prominent in the defense of Republican journalists and men of similar views in the reign of Louis Philippe, and later as a democratic agitator and leader of the work-

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ingmen's party. On the outbreak of the revolution of 1848 he became a member of the provisional government as minister of the interior, and in May was one of the five in whose hands the Constituent Assembly placed the interim government. But he offended everyone by his arbitrary conduct, and resigned. He was a candidate for the presidency against Louis Napoleon in the following December, but was ignominiously beaten. An unsuccessful attempt to provoke an insurrection against his rival put an end to his influence, and for the next 20 years he lived alternately in London and Brussels, being amnestyed only in 1870. After his return to France he was elected to the Assembly in 1871, and again in 1874.

Le'dum Oil. See LABRADOR TEA.

Led'yard, John, American traveler: b. Groton, Conn., 1751; d. Cairo, Egypt, 17 Jan. 1789. He entered Dartmouth College in 1772, with a view of fitting himself for missionary duty among the Indians. The restraints of this mode of life proving irksome, he absented himself at one time from college for several months, during which he visited the Indians of the Six Nations; and, finally abandoning the idea of becoming a missionary, he embarked on the Connecticut River in a canoe of his own fashioning, and floated down to Hartford. After a brief experience as a theological student, he shipped at New London as a common sailor in a vessel bound for the Mediterranean, and at Gibraltar enlisted in a British regiment, but was discharged at the request of his captain. He accompanied Captain Cook on his third voyage round the world, 1776-80, and of this voyage he kept a private journal, which in accordance with a general order of the government was taken from him on the return of the expedition to England. Subsequently he wrote out from recollection, assisted by a brief sketch issued under the sanction of the admiralty, an account of the expedition, published in 1783. During the two years succeeding his return to England he remained in the British naval service, but steadily refused to take arms against his native country. In December 1782, he found means to escape. He intended to journey through northern Europe and Asia and after surmounting many obstacles arrived at Irkutsk, where on 24 Feb. 1788 he was arrested by order of the Empress Catherine, conducted with all speed to the frontiers of Poland, and there dismissed, with an intimation that he would be hanged if he re-entered Russia. Ledyard found his way back to London in the spring, and was cordially received by Sir Joseph Banks and others who had befriended him. Undaunted by previous adversities, he eagerly accepted an offer to undertake an expedition into the interior of Africa; and when asked how soon he would be ready to set out, replied: "To-morrow morning." He departed from England in the latter part of June, intending to cross the African continent in a westerly direction from Sennaar, and had proceeded as far as Cairo, when he died. For capacity of endurance, resolution, and physical vigor, he was one of the most remarkable of modern travelers. Many extracts from his journals and his private correspondence with Jefferson and others are given in Spark's memoir of him.

Ledyard, William, American soldier: b. Groton, Conn., about 1750; d. Fort Griswold, Conn., 7 Sept. 1781. He held the commission of colonel in the militia of Connecticut, and during the marauding expedition of Arnold in September 1781, was in command of Forts Trumbull and Griswold, which protected New London. He refused a demand for the surrender of Fort Griswold, and resisted for nearly an hour the attack of a British force numbering 800 men. The command of the attacking force devolved upon Major Bromfield, a Tory, who effected an entrance into the fort after nearly 200 of his men had been disabled, including 48 killed, the Americans having lost about a dozen killed. To Bromfield's inquiry: "Who commands this garrison?" Ledyard replied: "I did, sir, but you do now," at the same time handing him his sword. Bromfield immediately plunged it through the body of Ledyard, killing him upon the spot. A massacre of the Americans ensued, which was not ended until more than 100 of them were killed and wounded. A monument has been erected near the spot to commemorate this event.

Lee, Agnes Rand, American writer: b. Chicago. She has published 'The Round Rabbit,' a juvenile, and a translation of 'The Poems of Theophile Gautier' (1903).

Lee, Albert, American author and editor: b. New Orleans 11 May 1868. He was graduated from Yale in 1891, having during his senior year edited the 'Yale Literary Magazine.' In 1891-4, he was on the editorial staff of the New York Sun; in 1895 became editor of 'Harper's Round Table'; and in 1899 was for a short time associate editor of 'McClure's Magazine,' becoming managing editor of 'Harper's Weekly' in the same year. In 1901-3 he was associate editor of 'Collier's Weekly,' taking the position of managing editor in January 1903. He has written 'Tommy Tiddies' (1896); 'Track Athletics in Detail' (1897); 'The Knave of Hearts' (1897); 'Four for a Fortune' (1898); 'He, She, and They' (1899).

Lee, Alfred, American Protestant Episcopal bishop: b. Cambridge, Mass., 9 Sept. 1807; d. Wilmington, Del. 12 April 1887. He was graduated at Harvard in 1827, and after studying law practised for three years in New London, Conn. Feeling, however, that his vocation was elsewhere he was admitted to the General Theological Seminary, where he was graduated in 1837. He was elected rector of Calvary Church, Rockdale, Pa. (1838), but on being consecrated first bishop of Delaware in 1841, took charge of Saint Andrew's, Wilmington, the following year. He was a member of the American Committee for Revision of the New Testament (1881) and presiding bishop (1884-7). He is the author of 'Life of Saint Peter' (1852); 'Life of Saint John' (1854); 'A Treatise on Baptism' (1854); 'Harbinger of Christ' (1857); Co-operative Revision of the New Testament' (1881); etc.

Lee, Ann, foundress of the Society of Shakers in America: b. Manchester, England, 29 Feb. 1736; d. Watervliet, N. Y., 8 Sept. 1784. She was the daughter of a blacksmith and uneducated, and in 1758 joined the Shakers, who had seceded from the Society of Friends. In 1762 she was married to a blacksmith named Standerin, or Stanley. She believed herself in-

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spired, and in 1770 was imprisoned for preaching the new doctrine of celibacy. In 1774 she emigrated to America and founded at Watervliet two American Societies of Shakers. By her adherents she was called "Mother Ann." See SHAKERS.

Lee, Arthur, American diplomatist: b. Stratford, Westmoreland County, Va., 21 Dec. 1740; d. Urbana, Middlesex County, Va., 12 Dec. 1792. He was educated at the University of Edinburgh; entered the practice of medicine at Williamsburg, Va.; studied law in the Temple, London (1766-70); practised in England in 1770-6; closely observed colonial questions; was a member of the society known as "The Supporters of the Bill of Rights," by which ministerial measures were discussed; and in 1770 was appointed associate of Franklin as London agent of Massachusetts colony. When Congress appointed Franklin, Jay, and Dickinson a committee to correspond with friends of the colonies in other parts of the world, Lee became secret agent in London of the committee; and in 1776 he was chosen by Congress joint commissioner with Franklin and Deane to obtain a treaty of alliance with France. In 1777 he despatched special missions to the governments of Spain and Prussia; in 1778 became commissioner to Spain; but in 1779 was recalled owing to his disagreements with Franklin and Deane. He was a representative in the Virginia general assembly in 1781; a delegate to the Continental Congress in 1781-4; and a member of the board of treasury in 1784-9. He opposed the adoption of a Federal constitution. Consult R. H. Lee, 'Life of Arthur Lee' (1829).

Lee, Charles, American soldier: b. Dernhall, Cheshire, England, 1731; d. Philadelphia 2 Oct. 1782. In 1751 he entered the English army as lieutenant of the 44th, which he accompanied to America in 1754, and with which he was present at Braddock's defeat on the Monongahela (9 July 1755). He was wounded in Abercrombie's attack on Ticonderoga (1 July 1758), took part in the capture of Montreal in 1760, and was promoted major in 1761. He served in Burgoyne's division in Portugal in 1762, and was for a time busy with a scheme for establishing in America two colonies, one on the Ohio, the other on the Illinois, to be recruited from Switzerland and Germany as well as New England. In 1764 he went to Poland, there was appointed to the staff of King Stanislaus Augustus, in 1766 accompanied the Polish embassy to Turkey, in 1769 as a major-general in the Polish army fought in a campaign against the Turks, and having called his superior officers fools, left the service and returned to England. He was made lieutenant-colonel on half-pay in 1772, but was further unrecognized by the British government, and in disappointment came to America 10 Nov. 1773, and by skilful display of what military knowledge he possessed attracted the attention of the Continental Congress, then eager to obtain competent leaders for the Revolutionary army. His career thenceforth was perhaps the strangest in the annals of the Revolution. He wished to become commander-in-chief of the American forces, but accepted the appointment as second of the major-generals, Artemas Ward (q.v.) being the first. To inspire public con-

fidence he purchased for £5,000 Virginia currency (about £3,000 sterling), an estate in Berkeley County, Va.; but he did not assume his rank until guaranteed by Congress pecuniary indemnity for possible losses incurred in so doing. He undeservedly received popular credit for Moultrie's successful defense of Charleston, S. C. (28 June 1776), and was called the "Hero of Charleston." In 1776 he became first major-general upon the resignation of Ward. He failed to obey when ordered by Washington to cross the Hudson from Westchester County with his 7,000 troops and join the latter in New Jersey; but when Washington was compelled to fall back on Princeton (2 Dec. 1776), crossed the river to Morristown and encamped there with 4,000 troops. Gates marched from Ticonderoga with seven regiments for Washington's aid, but Lee diverted three of the regiments to Morristown. Washington crossed the Delaware into Pennsylvania, and Lee diligently spread reports of the commander-in-chief's incapacity and planned a flank movement upon the British army whose success he intended should secure his own appointment to replace Washington. He was, however, captured at Baskingridge (13 Dec. 1775), and imprisoned at New York, where he deserted the American cause, and designed a plan for the subjugation of the American colonies, the original draft of which was found among the private papers of the Howes in 1857. He was exchanged in 1778, and re-entered the American service for reasons not fully known; but his insubordination at Monmouth (28 June 1778) nearly lost the day, and he was suspended from command for one year. A subsequent disrespectful letter to Congress caused his dismissal from the army. His treasonable correspondence with the British authorities was not discovered till many years after. He wrote 'Strictures on a Friendly Address to all Reasonable Americans' (1774) in reply to Dr. Myles Cooper (q.v.); and made a foolish claim to be the author of the "Junius" letters. Consult the 'Memoirs,' edited from his papers by Langworthy (1792); and Moore, 'The Treason of Charles Lee' (1858).

Lee, Charles, American cabinet officer: b. Leesylvania, Va., 1758; d. Fauquier County, Va., 24 June 1815. He was a brother of Henry Lee, soldier (q.v.). He was graduated from the College of New Jersey in 1775; studied law in the office of Jared Ingersoll at Philadelphia; practised in Westmoreland County, Va.; and sat in the Virginia assembly. On 10 Dec. 1795 he was appointed by Washington attorney-general of the United States, and this office he filled until the last month of Adams' administration (1801). He declined an appointment by Jefferson as chief justice of the United States circuit court for the 4th circuit.

Lee, Eliza Buckminster, American prose writer: b. Portsmouth, N. H., 1794; d. Brookline, Mass., 22 June 1864. She was married to Thomas Lee of Boston, where the greater part of her life was spent. She was a popular author in her day and among her books are 'Sketches of New England Life' (1837); 'Delusion' (1839); a translation from the German of the 'Life of Jean Paul Richter' (1842); 'Naomi; or, Boston Two Hundred Years Ago' (1848); 'Parthenia; or, The Last Days of

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Paganism' (1858); and a translation of Berthold Auerbach's 'Barefoot Maiden' (1860).

Lee, Fitzhugh, American soldier and diplomatist: b. Clermont, Fairfax County, Va., 19 Nov. 1835. He was the nephew of Robert E. Lee (q.v.). Appointed as cadet at large to West Point by President Fillmore, he entered the Academy at 16 and was graduated in 1856, being at the head of his class in horsemanship, and receiving an appointment to the famous Second Cavalry of which A. S. Johnston was colonel and R. E. Lee was lieutenant-colonel. After serving for a year at Carlisle Barracks as cavalry instructor of recruits, he reported to his regiment on the frontier of Texas and was greatly distinguished in several fights with the Indians, being mentioned in the official reports for skill and gallantry. In a fight with the Comanches, 13 May 1859, he was so severely wounded, being pierced through the lungs with an arrow, that the surgeons despaired of his life, but he recovered and joined his command, and led a part of his company in January 1860, in a very notable and successful fight with the Indians, in which he greatly distinguished himself in a single combat with an Indian chief. In November 1860 he was ordered to West Point as instructor of cavalry tactics. When Virginia seceded from the Union he promptly resigned his commission and tendered his services to his native State. He served for a time on the staff of General R. S. Ewell, and in September 1861 he became lieutenant-colonel, and in April 1862 colonel of the 1st Virginia cavalry. Henceforth he was intimately connected with Stuart's cavalry and won constant reputation for dash, daring, and intelligent execution of duty. After the battles around Richmond he was made brigadier-general, his brigade consisting of the 1st, 3d, 4th, 5th, and 9th Virginia cavalry, and a battery of horse artillery. In the campaign against Pope and the Maryland campaign the cavalry rendered most important service, and Gen. Lee did his full duty in these operations. When General Robert Lee withdrew from Sharpsburg, Fitzhugh Lee's brigade relieved the pickets and held the lines till the army had crossed the Potomac. On 17 March 1863 Averell's division of 3,000 cavalry crossed the river at Beverly's Ford, and attacked him; though he could only put 800 troopers in the saddle, he successfully resisted Averell, and after one of the most hotly contested cavalry battles of the war drove him back across the river. In the Chancellorsville movement he protected Jackson's flank, and made a very important reconnaissance by which he located the flank and rear of the enemy, and enabled Jackson to attack it to the best advantage. In the autumn of 1863 he was made major-general, and given command of a division of cavalry. In the campaign of 1864 he rendered important service, holding in check the advance of Grant's army until General R. E. Lee's infantry could occupy Spotsylvania, repelling Sherman's raid on Richmond, defeating Sheridan at Trevilians and Samaria Church, routing Wilson at Reams Station, and operating with Early in the Valley, being severely wounded at the battle of Winchester. When Hampton was sent south Lee was given the command of the entire cavalry corps of the army of northern Virginia, con-

ducted the retreat to Appomattox, was one of the council of war whom Robert Lee consulted, and one of the leaders in the last charge of the army of northern Virginia. He "accepted the situation" after the surrender, and went to work on his farm at Richland. From 1886 to 1890 he was governor of Virginia. In 1896 he was appointed consul-general to Cuba, in which position he kept the State Department thoroughly informed of the Spanish policy during the rebellion, and vigorously upheld the rights and interests of the United States; after the destruction of the Maine he did much to prevent the premature outbreak of war with Spain, but when war was inevitable he was recalled. In May 1898 he was appointed major-general of United States volunteers, and assigned to the command of the 7th army corps. At the close of the war he was made military governor of the province of Havana, and later was given the command of the department of the Missouri.

J. W. JONES, D.D.,
President Southern Historical Society.

Lee, Francis Bazley, American lawyer and historical writer: b. Philadelphia 3 Jan. 1869. He was educated at the State Model School in Trenton, N. J., and was graduated from the Wharton School of Political Economy in the University of Pennsylvania in 1890. He was admitted to the New Jersey bar in 1893 and has since practised his profession in Trenton. In addition to various historical monographs relating to New Jersey, he is the author and editor-in-chief of 'New Jersey as a Colony and a State.'

Lee, Francis Lightfoot, American patriot: b. Stratford, Westmoreland County, Va., 14 Oct. 1734; d. Richmond County, Va., 3 April 1797. He was elected to the Virginia house of burgesses for Loudoun County in 1765, and later represented Richmond County in that assembly. He signed the Westmoreland declaration against the Stamp Act (1765), and on 15 Aug. 1775 became a member of the Continental Congress, where he served until the spring of 1779. On 4 July 1776 he was one of the 56 signers of the Declaration of Independence. He also was a member of the committee that prepared the articles of confederation, and was prominent in debate, particularly on the questions of the Newfoundland fisheries and the navigation of the Mississippi. After his retirement from Congress he served briefly in the Virginia legislature. Consult Sanderson, 'Lives of the Signers,' Vol. IX. (1827).

Lee, Gerald Stanley, American Congregational clergyman and author: b. Brockton, Mass., 4 Oct. 1861. He was graduated from Middlebury College, Vt., in 1885, and from Yale Divinity School in 1888. He has lectured on literature and the arts, and is the author of 'About an Old New England Church' (1893); 'The Shadow Christ' (1896); 'The Lost Art of Reading' (1902); 'The Confessions of an Unscientific Mind' (1902).

Lee, Guy Carleton, American educator and author. He was graduated from Dickinson College, Pa., where he was for a time professor of history. He has since filled other educational posts and has been literary editor of the Baltimore *Sun* from 1901. He is the author of:

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'Hincmar: An Introduction to the Study of the Church in the 9th Century' (1898); 'Principles of Public Speaking' (1899); 'Historical Jurisprudence' (1900); 'Source Book of English History' (1900); 'A History of England' (1901).

Lee, Mrs. Hannah Farnham Sawyer, American novelist and miscellaneous writer: b. Newburyport, Mass., 1780; d. Boston 27 Dec. 1865. She was married to G. G. Lee of Boston. Her works, several of which exerted considerable influence during the second quarter of the 19th century, are: 'Grace Seymour' (1835); 'Three Experiments in Living' (1838); 'Elinor Fulton,' a sequel to the preceding; 'Rich Enough'; 'The Huguenots in France and America' (1842); 'Stories from Life' (1849); 'Memoir of Pierre Toussaint' (1853); 'History of Sculpture and Sculptors'; etc.

Lee, Harriet, sister of Sophia Lee (q.v.): b. London 1756; d. Clifton 1 Aug. 1851. In 1786 she published the 'Errors of Innocence,' a novel succeeded by several others now forgotten. In 1797-1805 appeared her 'Canterbury Tales,' 8 of the 10 tales of which were her own, the others being by her sister Sophia. They enjoyed a great popularity in the early part of the 19th century, and a new edition was published in New York in 1856-7. One of the most remarkable is 'The German's Tale-Krutzner,' from which Lord Byron borrowed not merely the plot and the machinery down to the most trivial incidents, but in some instances the language, of his 'Werner.' She also wrote two dramas, the 'New Peerage' and the 'Three Strangers.'

Lee, Henry, American soldier: b. Leesylvania, Westmoreland County, Va., 29 Jan. 1756; d. Cumberland Island, Ga., 25 March 1818. He was graduated from the College of New Jersey in 1774; in 1775 became a captain in Col. Theodoric Bland's legion of Virginia cavalry; and in September 1777 joined Washington's army in Pennsylvania. Promoted major for services in battle (January 1778), he was given command of a partisan corps consisting of two troops of horse, and later increased by a third troop and an infantry company. This corps, which was employed in the annoyance of the British march and camp, was known as 'Lee's legion,' and its commander as 'Light Horse Harry.' On 19 Aug. 1779 Lee surprised and captured the British post at Paulus Hook (q.v.), N. J. For this achievement, which is regarded as one of the most brilliant exploits of the Revolution, Congress voted him a gold medal. He was promoted lieutenant-colonel, and in the autumn of 1780 was sent to South Carolina to join Greene's army. He covered the American retreat through North Carolina (February 1781), and was involved in some smart skirmishes with Tarleton's dragoons. After Greene had crossed into Virginia, Lee remained in North Carolina to harass the enemy, and, although he could not surprise Tarleton, did defeat 400 loyalists under Col. Pyle. He outfought Tarleton at Guilford Court House (15 March 1781), and with Marion, by cutting Rawdon's line of communication, compelled that officer to abandon Camden (10 May 1781). He took Augusta, Ga. (5 June 1781), and having rejoined Greene, fought with distinction at Eutaw Springs (8 Sept. 1781), and captured some of Rawdon's rear-guard in the

British retreat. After having been present at Yorktown, he shortly resigned his commission. In 1785-8 he was a Virginia delegate to the Continental Congress; in 1788 was a member of the Virginia convention for the ratification of the Federal constitution; in 1789-91 sat in the general assembly of the State; and in 1792-5 was governor. In 1794 he was appointed by Washington to command the 15,000 troops sent to suppress the 'Whiskey Insurrection' (q.v.) in western Pennsylvania. After service as a representative in the Sixth Congress (1799-1801), he withdrew from public life. In his 'Funeral Oration upon President Washington,' pronounced in 1799 before both houses of Congress, occurs the since famous phrase, 'First in war, first in peace, first in the hearts of his fellow-citizens.' He wrote 'Memoirs of the War in the Southern Department of the United States' (1812), published in revision with a memoir by his son R. E. Lee (q.v.) in 1869.

Lee, Henry Washington, American Protestant Episcopal bishop: b. Hamden, Conn., 26 July 1815; d. Davenport, Iowa, 26 Sept. 1874. He was graduated from Trinity College, Hartford, in 1835; studied theology, and received deacon's orders in 1838. In 1840-8 he was rector at Springfield, Mass., and in the latter year took charge of St. Luke's Church in Rochester, N. Y. In 1854 he was made bishop of Iowa, holding the position till his death; he was one of the founders of Griswold College at Davenport, and was instrumental in obtaining an endowment for his diocese and the erection of the cathedral. He published 'Manual of Family Prayers,' and a number of sermons and addresses; also 'Prayers for Children' and other books for young people.

Lee, James Wideman, American Methodist clergyman: b. Rockbridge, Ga., 28 Nov. 1849. He was graduated from Emory College, Ga., in 1875; in 1876 was ordained to the ministry of the Methodist Episcopal Church South, and held Georgia pastorates in Carrollton, Dalton, Rome, and Atlanta. In 1893 he went to St. Louis as pastor of St. John's Church; was presiding elder in St. Louis from 1897 to 1901, when he returned to his pastorate at St. John's. In 1894 he was the head of an expedition to Palestine to secure material for the 'Earthly Footsteps of Christ and His Apostles,' which he published in 1895 (with J. H. Vincent, q.v.). He has also written: 'The Making of a Man' (1892), translated into Japanese and Chinese; 'Henry W. Grady, Editor, Orator and Man' (1896); 'History of Methodism' (1900); and has edited and illustrated the 'Self Interpreting Bible.'

Lee, Jennette Barbour Perry, American novelist: b. Bristol, Conn., 10 Nov. 1860. She was graduated from Smith College, Mass., in 1886, was professor of English in the College for Women at Western Reserve University 1893-6, and in the year last named was married to Rev. G. S. Lee (q.v.). She has published: 'Kate Wetherell' (1900); 'A Pillar of Salt' (1901); 'The Son of a Fiddler' (1902).

Lee, Jesse, American Methodist clergyman: b. Prince Edward County, Virginia, 1758; d. September 1816. He was admitted to the Conference as a preacher among the Methodists in 1783, and was chosen as a friend and traveling

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companion by Francis Asbury. His writings have been the basis of much of the history of early Methodism in America. In 1789 he traveled over New England and preached Methodism from Connecticut to Maine. He formed the first Methodist congregation in New England at Stratfield, Conn., 26 Sept. 1787. In 1792 he preached in Massachusetts, and gathered the first class at Boston 13 July 1792. He was chaplain to Congress during six successive terms. He is known in New England as "The Apostle of Methodism." He wrote 'A History of Methodism in America' (1807). Consult: Lee, 'Life and Times of Jesse Lee', (1848).

Lee, John Doyle. See MOUNTAIN MEADOW MASSACRE.

Lee, Luther, American Methodist clergyman: b. Schoharie, N. Y., 30 Nov. 1800; d. Flint, Mich., 13 Dec. 1889. He entered the Genesee Conference in 1827, became an itinerant preacher and a temperance and anti-slavery lecturer, and was several times mobbed on account of his abolitionist sentiments. From 1843 to 1867 he was a member of the Wesleyan body, having as a Wesleyan clergyman been president in 1853 of Michigan Union College at Leoni, and pastor of churches at Syracuse and elsewhere, but in 1867 returned to the Methodist Episcopal denomination. He was the author of 'Universalism Examined and Exposed' (1836); 'The Immortality of the Soul' (1850); 'Slavery Examined in the Light of the Bible' (1855); 'Elements of Theology' (1856); etc.

Lee, Margaret, American novelist: b. New York 27 Nov. 1841. Among her numerous fictions may be cited 'Lorimer and Wife' (1881); 'Divorce' (1882); 'One Touch of Nature' (1892).

Lee, Mary Catherine Jenkins, American novelist: b. New Bedford, Mass. She has published: 'A Quaker Girl of Nantucket' (1889); 'In the Cheering Up Business' (1891); 'A Soulless Singer' (1895).

Lee, Nathaniel, English dramatic poet: b. Hatfield about 1653; d. London 1692. He was educated at Cambridge, turned his attention to the drama, and in 1675 produced his tragedy of 'Nero,' and from that time to 1681 produced a tragedy yearly. From 1684 to 1688 he was confined in Bethlehem Hospital on account of insanity, and after his discharge wrote two more tragedies. He is the author of 11 plays, all of which were acted with applause; but his natural fire and pathos were buried in a torrent of words, and clouded by a tendency to turgid and bombastic eloquence. In his play, 'The Rival Queens' (1677), occurs the oft-quoted line:

When Greeks joined Greeks then was the tug of war.

Lee, Richard Henry, American patriot: b. Stratford, Westmoreland County, Va., 20 Jan. 1732; d. Chantilly, Va., 19 June 1794. He was educated in England, but returned in 1752 to Virginia, where he soon became prominent in public affairs, and was elected to the house of burgesses. In 1773 he became a member of the committee of correspondence to communicate with the other colonies, and in 1774 was a delegate from Virginia to the first Continental Congress. There he attracted attention by his eloquence, and drafted the petition to the king. In the second Congress he prepared the address

to the people of Great Britain. Both of these documents are remarkable state papers. On 7 June 1776 he moved "that these united colonies are and of right ought to be free and independent states; that they are absolved from all allegiance to the British crown; and that all connection between them and the states of Great Britain is and ought to be totally dissolved." He was in the Virginia legislature in 1780-4, was elected president of Congress in 1784, in 1786 was again a member of the State legislature, and in 1787 also sat in Congress. Upon the adoption of the Federal Constitution, to which he was opposed, he was elected one of the first two senators from Virginia, and there remained, at first as an anti-Federalist, until his resignation in 1792. He was one of the notable orators of his time. Consult: R. H. Lee (his grandson), 'Life and Correspondence of R. H. Lee' (1825).

Lee, Robert Edward, American soldier: b. Stratford, Westmoreland County, Va., 19 Jan. 1807; d. Lexington, Va., 12 Oct. 1870. He received his secondary education in good private schools in Alexandria, Va., and when he entered West Point, at 18, in 1825, at once took a very high stand, maintained it throughout his course, and was graduated second in his class, without ever receiving a single demerit, a record very rarely attained. He was at once commissioned brevet 2d lieutenant in the engineers, and won high reputation in this important branch of the service. In 1832 he married Mary Custis, daughter of the adopted son of Washington, and thus became proprietor of Arlington on the Potomac, and other estates. In 1836 he was promoted to 1st lieutenant, and in 1838 was made captain. In the Mexican War he made a brilliant record for skill and gallantry as an engineer officer, being brevetted major at Cerro Gordo, 18 April 1847, lieutenant-colonel at Contreras, and Churubusco, and colonel at Chapultepec. General Scott constantly consulted him, acted largely on his advice, and mentioned him repeatedly in his official reports. At the close of the Mexican War he was made a member of the board of engineers of the United States army; 1 Sept. 1852 he was made superintendent of the Academy at West Point, and filled the position so ably and acceptably that there was a general desire to retain him; but in 1855 he was made lieutenant-colonel of the 2d cavalry, and did very efficient service against the Comanches and other Indians on the frontier of Texas. In October 1859 the John Brown raid at Harper's Ferry occurred, and Lee chancing to be at Arlington on furlough was ordered with a body of marines to suppress the revolt, and did so very promptly by storming the engine house in which John Brown and his party had taken refuge, and turning them over to the civil authorities. Soon after he was promoted to a full colonelcy, but the war came on rapidly, and he was soon to close his service in the United States army.

He was an ardent Union man, and hoped against hope that some compromise might be reached. When, however, the war had actually begun, and Virginia had seceded, he did not hesitate long as to the path of duty. President Lincoln sent the elder Blair to him with an offer of the supreme command of the United States

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army, but while treating the offer and the message with all proper respect, he told Mr. Blair very emphatically that he "could not take up arms against his State, his home, and his children." A few days later he sent in his resignation. Having once decided the question he never faltered in his allegiance, or doubted the correctness of his decision. He said to General Wade Hampton, in 1869, as they were discussing the war and its results: "I could have taken no other course without dishonor, and if it were all to be gone over again, I should act in precisely the same manner." Going to Richmond at the request of the Virginia Convention, he was made major-general and commander-in-chief of the Virginia forces, and when Virginia joined the Confederacy he was commissioned in the Confederate service, and was made one of the five full generals. His services in organizing and equipping raw troops, and planning campaigns were very valuable, and the latter part of July 1861 he took command in West Virginia; the campaign failed through the fault of others, and he was severely criticised by the newspapers. He was put in charge of the sea coast defenses in South Carolina and Georgia, and there can be but little doubt that his skill and energy did much to put that department in condition to make the heroic defense afterward made. In February 1862 he was made military adviser to President Davis, and occupied that position till the wounding of General Johnston at Seven Pines, and on 3 June was assigned to the command of the Army of Northern Virginia. Determining not to await McClellan's expected reinforcements General Lee at once began preparations to attack and drive him from the siege of Richmond. Accordingly he summoned "Stonewall" Jackson to his aid, collected all other reinforcements that he could, and on 26 June opened the Seven Days' battles by attacking McClellan's lines on the Chickahominy. The Confederates won several victories, and while they were repulsed at Malvern Hill, where McClellan had made a last stand to save his army, Lee had prepared for a combined attack the next morning, when McClellan retreated that night under the cover of his gunboats at Harrison's landing, 30 miles below Richmond. While McClellan's army was not annihilated, as Lee designed, and as might have been but for the failure of some of his subordinates, yet the siege of Richmond had been raised and McClellan's army was in a demoralized condition. Lee also captured 52 pieces of artillery, small arms, and large quantities of stores of every description. The Government at Washington were now far more solicitous about the safety of Washington than for the capture of Richmond, and Lee by a series of maneuvers brought it to pass that McClellan's troops were all brought to Washington to reinforce General Pope, who had taken command of the Army of Virginia. Lee's campaign against Pope culminated in the battles on the old field of Manassas, where the Confederate commander routed Pope and drove him into the fortifications in front of Washington. (See BULL RUN, SECOND BATTLE OF.) Then followed the Maryland campaign, in which Jackson captured Harper's Ferry with 11,000 prisoners and large quantities of arms and stores. At Sharpsburg (Antietam), 17 Sept. 1862,

Lee resisted every attack of McClellan's well equipped troops, advanced his lines on parts of the field, and remained in battle line 24 hours, though his men were weakened by lack of food, and then learning that McClellan was receiving large reinforcements, withdrew across the Potomac unmolested. (See ANTIETAM, BATTLE OF.) On 7 November orders from Washington relieved McClellan and put Burnside in his place, who tried to "steal a march" and crossed the Rappahannock at Fredericksburg, but Lee divined his purpose and confronted him there. Both sides concentrated for battle and Burnside attacked Lee, who occupied a naturally strong position; the result was that Burnside received a bloody defeat and recrossed the river, where his strong works and heavy artillery rendered him safe from a counter attack from Lee. (See FREDERICKSBURG, BATTLE OF.) In February 1863 Burnside was succeeded by Hooker, whom Lee defeated at Chancellorsville (q.v.). In the Gettysburg campaign of 1863 Winchester was captured by Ewell and at Gettysburg, 1-3 July, Lee fought General Meade, gaining a decided victory the first day, gaining some ground on the second day, and receiving a bloody repulse on the third day. Though he remained in line of battle all day the 4th of July, and then for nine days afterward at Hagerstown, with an impassable river at his back, Meade did not attack, and Lee later retreated into Virginia. In 1864 General Grant had been made commander-in-chief of the United States army and took personal command of the army that was "to crush Lee and capture Richmond." He had under his command about 275,000 men well equipped and provisioned. To meet him Lee had not more than 75,000 men, badly armed, wretchedly equipped and poorly supplied with rations, clothing, ordnance stores, and transportation. And yet in that campaign he outgeneraled Grant, defeated him in every battle from the Wilderness to Petersburg and compelled him to sit down before Petersburg. During the remainder of the summer, fall and winter, Lee had to guard 40 miles of breastwork with a bare skirmish line, and yet meet every move of the enemy to supply his army when the railways not occupied by the enemy were all broken down, to recruit his thin and thinning ranks from a country already stripped of its men, and to witness the starving out of his army—yet all of these and other obstacles were met with a fertility of resource born of the highest order of military genius. In the early part of 1865 he was made commander-in-chief of all the armies of the Confederacy, but it was now too late to accomplish anything against the "overwhelming numbers and resources" against him. Shortly after the opening of the campaign of 1865, Lee determined to unite with Johnston, and strike Sherman before Grant could join him, but the condition of the roads and the lack of proper transportation delayed him until the active movements of Grant forestalled him, and brought the disasters of 1 and 2 April, which forced Lee's retreat and the end at Appomattox on 9 April, when the Army of Northern Virginia surrendered. When Lee rode into Richmond he was cheered by the Federal soldiers; and used his wide influence to pacify the country.

In October 1865 he became president of Washington College (now Washington and Lee



Photograph by Geo. S. Cook, Richmond.

GEN. ROBERT E. LEE.

'LEE—LEE FAMILY

University), Lexington, Va., and under his excellent administration the college was greatly improved and enlarged. His character was marked by modest simplicity and gentleness, by a spirit of self-denial, by want of bitterness toward the North but devotion to the interests of the South, by firmness in carrying out his purpose, and above all by simple, sincere active piety. Virginia has recently selected Lee as one of her two representatives whose statues are to be placed in the rotunda of the Capitol at Washington.

Consult: Cook, 'Life of Robert E. Lee'; Jones, 'Personal Reminiscences of Robert E. Lee'; Lee, F., 'Robert E. Lee' (Great Commander Series); Taylor, 'Four Years with Robert E. Lee'; Trent, 'Robert E. Lee' (1899); White, 'Robert E. Lee.'

J. W. JONES, D.D.,
President Southern Historical Society.

Lee, Sarah Wallis, English naturalist: b. Colchester, Essex, 10 Sept. 1791; d. Erith, Kent, 22 Sept. 1856. At 22 she was married to T. E. Bowditch, whom she accompanied on a mission of pacification to the Ashantees, and while with him in the Cape Coast Colony collected materials for a work on the aborigines of that country, which appeared in 1825, entitled 'Stories of Strange Lands.' Another work of the same character, entitled 'The African Wanderers' (3d ed. 1854), was equally popular. Her husband died in 1824 and she afterward lived in Paris, where in 1829 she was married to Robert Lee. She published in addition to the works named: 'Elements of Natural History: Zoology'; 'Taxidermy,' long a standard authority; 'Familiar Natural History'; etc.

Lee, Sidney, English author and literary editor: b. London 5 Dec. 1859. He was educated at Balliol College, Oxford, was assistant editor 'Dictionary of National Biography,' Vols. I.-II. (1883-90), joint-editor with Leslie Stephen (q.v.) Vols. XXII.-XXVI. (1890-1), and sole editor Vols. XXVII.-LXIII. (1891-1901), and of its Supplement, Vols. LXIV.-LXVI. (1902). To this work he contributed 820 articles. He is the author of 'A Life of William Shakespeare' (1898); 'A Life of Queen Victoria' (1902). In 1903 he delivered a course of Lowell Institute lectures in Boston, Mass., repeating them in other American cities also. These lectures, revised and somewhat extended, were collected in book form entitled, 'Great Englishmen of the 16th Century' (1904).

Lee, Sophia, English author: b. London May 1750; d. Clifton, near Bristol, 13 March 1824. She was the eldest daughter of John Lee, an actor. She was the author of a comedy entitled 'The Chapter of Accidents,' brought out at Haymarket Theatre in 1780 with great success. The next year her father died, and she removed with her sisters to Bath, where she devoted the profits of her play to the establishment of a young ladies' seminary over which she and her sister Harriett (q.v.) long presided. She wrote two or three novels and contributed 'The Young Lady's Tale,' and 'The Clergyman's Tale' to the 'Canterbury Tales,' published by herself and her sister.

Lee, Stephen Dill, American soldier: b. Charleston, S. C., 22 Sept. 1833. He was gradu-

ated from West Point in 1854; served on the frontiers of Texas, Kansas, and Nebraska; was promoted to the rank of 1st lieutenant in 1856, and served in Florida in 1857. On the secession of South Carolina, he resigned from the United States army, and was made captain of South Carolina volunteers, and gradually rose from this rank to that of lieutenant-general. He was at Seven Pines, at the Seven Days' Battles around Richmond, in the campaign against Pope, and at the second battle of Bull Run. He was placed in command of the forces at Vicksburg, but was succeeded by General Pemberton before the capture of the city by the Federals. After the war he settled at Columbus, Miss., and soon took a prominent part in the affairs of the State. He was elected to the State Senate in 1870, and was a prominent member of the constitutional convention in 1890. In 1880 he was made president of the State Agricultural and Mechanical College at Starkville, holding this position till 1899, when he became commissioner of the Vicksburg National Park.

Lee, Vernon. See *PAGET, VIOLET*.

Lee, William, English inventor: b. Nottinghamshire, England, about 1560; d. Paris, France, about 1610. He was a graduate of Cambridge University and is remembered as the inventor of the stocking frame. He presented a pair of silk stockings, knit by his machine, to Queen Elizabeth in 1598, but the hand-knitters violently opposing the introduction of machinery to do their work, he went to France. Meeting with no better success there he became greatly discouraged, and his death is said to have resulted from his disappointment.

Lee, William, American diplomatic representative: b. Stratford, Va., 1737; d. near Williamsburg, Va., 27 June 1795. He was a brother of Arthur Lee (q.v.), Francis Lightfoot Lee (q.v.), and Richard Henry Lee (q.v.). Prior to the Revolution he was active as a merchant in London; and there he was for a time agent of Virginia colony. In 1777 he became associated with Thomas Morris (q.v.) as superintendent of the commercial affairs of the United States at Nantes, France, and in 1778 was appointed commissioner to Prussia and Austria, but accomplished nothing. A treaty drawn up by him with Neufville, a merchant of Amsterdam, in 1778, and approved by the burgomaster of that city, became the avowed cause of the war declared by Great Britain against Holland. Consult Wharton, 'Revolutionary Diplomatic Correspondence of the United States' (1889).

Lee Family, The, a family of Virginia, some of whose members have been conspicuous in public affairs at almost every stage of American history. Among all the eminent names of the South there is none that outranks this in the number or prominence of those who represent it in the records of the nation. Sprung from a cavalier line of old and distinguished English stock, the Virginia Lees have continued in the New World that order of Old-World aristocracy—an aristocracy of character and culture, of honor and of public service—which has legitimated itself under the broadening conditions of democratic development, and to which, as well as to the plainer but not less masterful middle-class English element that elsewhere en-

LEE-HAMILTON — LEECH

tered into the making of the republic, democracy in the American Commonwealth owes its most essential traits. That Richard Lee who, during the reign of Charles I., brought his large household to Virginia, and himself became the first of this illustrious line in America, brought also to the Northern Neck in Northumberland County, where he settled, an English yeoman's sturdiness raised and enlightened and nowise debilitated by the refinements of gentility. A stout partisan of the Stuart cause, he supported Sir William Berkeley (q.v.) in his resistance to Cromwell's policy, and through this attitude the colonists, threatened by the Protector's fleet, forced its commander into a treaty styling the colony an independent dominion. Lee is said to have joined successfully with Berkeley in having Charles II. proclaimed king in Virginia nearly two years earlier than his final coronation in London. Richard Lee's son Richard and the second Richard's third son, Thomas, were leaders in the colony, Thomas dying just as his governor's commission was made out. By his wife, Hannah Ludwell, he had five sons who became distinguished for public and patriotic acts. Of these, Richard Henry Lee (q.v.), by reason of the diversity and singular efficiency of his services, rendered for many years before the Revolution, during that struggle, and for ten years afterward, to Virginia and all the colonies and later States, stands among the pre-eminent figures of his day. The steps preliminary to the Declaration of Independence can never be recalled without remembrance of him as mover of the resolutions which led to its adoption in the Continental Congress. The address to the people of Great Britain, which he wrote, is perhaps surpassed in weight and loftiness of spirit by no American state paper. His brother, Francis Lightfoot Lee (q.v.) not only was one of the signers of the Declaration, but also made liberal sacrifices for the patriot cause, all the more to be remembered to his honor when it is considered that by temper and education he was fitted rather for the occupations of a student, and for social elegancies, than for the turmoil of politics and the tragedies of war. Arthur Lee (q.v.), youngest son of Thomas, was educated in two professions, medicine and law, and distinguished himself by public services both at home and abroad. As representative of the colonies in Europe during the Revolution, he displayed abilities as a man of learning, versatility, and political sagacity, which he applied in ways highly useful to his country in critical times. William Lee (q.v.), another of the sons of Thomas, also represented the United States in Europe at that period, with less distinction than others of this family attained, but not without some exhibition of their unusual qualities. The fame of Henry Lee (q.v.), the "Light Horse Harry" of the Revolution, unique in several respects, is enduring by reason of his political and military services, while his name is endeared to the American people for his noble eulogy of Washington. As first cousin of Richard Henry and of Arthur Lee, his rights are as valid as theirs in the name to which he adds a lustre in return for that it sheds on him. His son Robert Edward Lee (q.v.) not only stands as a connector of the two great epochs of his country's history—the Revolutionary period and that of the Civil War—but in his life and

deeds, too recent to call for special reference here, he worthily perpetuated the fame of the great family whose name he bore, whose blood, whose spirit, whose traditions he inherited. His nephew, Fitzhugh Lee (q.v.), whose name may fittingly close this sketch, still represents in vigorous manhood the typical family stock; and to the varied honors of his predecessors he not only adds his own well-won fame, but joins to that a signal distinction, which he shares with fellow soldiers of the South, as one of those Americans who, in civil and in military life, have proved themselves efficient factors in the final restoration of the Union.

JOHN H. CLIFFORD,

Editorial Staff, "Encyclopedia Americana."

Lee-Hamilton, Eugene, English poet: b. London January 1845. He was educated at Oxford, and entered the diplomatic service in 1869, resigning in 1875. He was for many years an invalid, obliged to maintain a recumbent posture continually. Among his published works are: 'Poems and Transcripts' (1878); 'The New Medusa' (1882); 'Imaginary Sonnets' (1888); 'The Fountains of Youth' (1891). He is a half-brother of Violet Paget (q.v.), "Vernon Lee," and married in 1898 the novelist Annie E. Holdsworth (q.v.).

Lee, Mass., town, in Berkshire County; on the Housatonic River, and on the New York, N. H. & H. railroad; about 33 miles northwest of Holyoke, and 13 miles south of Pittsfield. The town includes the villages of South and East Lee. Lee is situated in an agricultural region; but the country is traversed by the southern spurs of the Green Mountains, known as the "Berkshire Hills" in this region. The delightful climate and beautiful scenery make Lee and vicinity favorite summer resorts. The town was settled in 1760 and incorporated in 1777. A fine white marble found in the town is much used for building purposes. The principal manufactures are paper and dairy products. The government of the town is administered by a town meeting or by officials elected at the annual town meeting. Pop. (1900) 3,506. Consult: Hyde and Hyde, 'Centennial History of Lee.'

Lee-board. See CENTRE-BOARD.

Lee-Metford Rifle, a military weapon manufactured for the use of the United States navy. It is a gun discharging a steel-jacketed bullet with smokeless powder. The velocity of the bullet is 2,460 feet per second, and the penetration, at the regulation range of 15 feet, is 62 pine boards each seven eighths of an inch in thickness. The pressure on the gun when fired is 60,000 pounds to the square inch. The rifle will kill at over a mile.

Leech, John, English illustrator: b. London 29 Aug. 1817; d. there 29 Oct. 1864. He studied at the Charterhouse School nine years, where Thackeray was his school-fellow; began the study of medicine at St. Bartholomew's Hospital; but soon he gave up his medical studies, and began making drawings. The first of his important works were the illustrations to the 'Ingoldsby Legends.' He joined the staff of 'Punch' in 1841. In that field he worked with pre-eminent success, supplying weekly pictures of all sections of English life—scenes of field and forest, of the busy streets, of the rustic cottage and ale-house, and the elegant city

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dwelling and club; the huntsman, the swell, the injured paterfamilias; the fast young lady and her grave portly mother; the housemaid and her follower, etc., all thrown off with remarkable precision, and showing a steady growth in artistic power. He was buried beside Thackeray in Kensal Green Cemetery. His designs for 'Punch' have nearly all been published separately as 'Pictures of Life and Character' and as 'Pencillings from Punch.' He also executed the Illustrations for 'The Comic History of England,' 'The Comic History of Rome,' and various other books. Consult: Brown, 'John Leech' (1882); Everitt, 'English Caricaturists' (1886); 'Life,' by Frith (1891).

Leech Lake, a body of water in Cass County, Minn.; the largest of the lakes which constitute the head-waters of the Mississippi River. It is about 1,300 feet above the level of the sea; 24 miles long and 15 miles wide. The short stream, which is the direct outlet of the lake and flows into the Mississippi, is called Leech Lake River. On the south and east shores is the Leech Lake Indian Reservation. The country round is well wooded and fish and game are plentiful.

Leeches, highly specialized *Annelida* constituting the order *Hirudinea* or *Discophora*. They are distinguished from most other annelids by the nearly complete obliteration of the coelom or body-cavity, owing to the development of parenchymatous connective tissue, muscles, etc., the presence of an anterior or oral sucker and a posterior or subanal sucker, and by the absence of setæ, except in *Acanthobdella*. In all leeches which have been carefully studied there are exactly 34 segments or somites, each represented by a ganglion in the central nervous system, and being of smaller size and simpler structure toward the ends than in the middle of the body, where each is divided into from 2 to 12 rings, one of which, sometimes regarded as the first sometimes as the middle ring, bears metamerick eye-like sense organs. Most leeches are temporary parasites, a few nearly permanent parasites; the rest are predatory hunters or scavengers, or they may change from one mode of life to another. They are marine, fresh-water, or terrestrial. The first class is most abundant, both in individuals and species, in cold seas, the second is both temperate and tropical, and the third is confined to warm regions. Four families are distinguished: the *Ichthyobdellidae* or fish-leeches, the *Glossiphonidae* or tortoise and snail leeches, the *Herpobdellidae*, or worm-leeches, and the *Hirudinidae*, or jawed leeches. The first two families possess a long protrusible proboscis and are much more closely allied than the *Herpobdellidae* and *Hirudinidae*, which have no proboscis. The *Ichthyobdellidae* are chiefly parasitic on fishes and, except a few fresh-water forms, are marine. Some of them, as *Branchellion*, are branchiate. The *Glossiphonidae* are richly represented in the fresh-water lakes and streams of North America by a great variety of species, most of which attach themselves to tortoises, whose blood they suck, or else they devour water-snails and small worms. A few are parasitic on fishes. In all of them the oral sucker is small and the eyes in one to four pairs placed near the median line. The *Herpobdellidae* contains slender, six or eight-eyed, pred-

aceous leeches, which are extremely abundant in fresh-water ponds and feed on small leeches and worms. They have no toothed jaws and the digestive tract is simple and straight. The *Hirudinidae* have 10 eyes, generally three-toothed jaws and a spacious sacculated digestive tract. Here belong the true blood-sucking leeches, the medicinal leech of Europe, and our native *Macrobdella decora*, also formerly largely employed in this country for blood-letting. The only terrestrial leech of the United States belongs to this family. It inhabits garden soil, feeds on earthworms, and is one of the largest leeches known. Consult: Leuckart and Brandes, 'Parasiten des Menschen'; Whitman, 'Quarterly Journal Microscopical Science' (1886); and Moore, 'Bulletin Illinois State Laboratory of Natural History' (1901).

Leeds, England, a municipal, parliamentary, and county borough and large manufacturing town, in the West Riding of Yorkshire, on the river Aire, 185½ miles north of London. The river, which in passing through the city is spanned by eight bridges, is navigable from its mouth in the Humber, and connects with the Leeds and Liverpool Canal. The town extends for about seven and one half miles from east to west, and about seven from north to south. From the extent of the manufactures the town is naturally smoky, and on the whole its appearance is not prepossessing, although much modern improvement has been effected. The most conspicuous building is the Roman-Corinthian town-hall, considered one of the finest municipal buildings in the kingdom. The greater portion of one wing is allotted to the Free Public Library, to which has been added the Fine Art Gallery. Leeds Infirmary, in the Gothic style, can accommodate 300 patients. Other notable buildings are the new general post-office, in the Renaissance style; the school-board offices, the Royal Exchange, the stock exchange, the Leeds Institute of Science, Art, and Literature; the Yorkshire College, the Grand Theatre, the new Empire Theatre, the grammar-school, the Coliseum (a public hall), etc. Among the places of worship are the parish church of St. Peter's; St. George's, with a tower and spire 160 feet high; Holy Trinity, a fine building in the Early English style; some of the Dissenting places of worship, and the Roman Catholic Church of St. Ann's. The chief educational institution is the Yorkshire College, a branch of the Victoria University (whose headquarters are in Manchester, having taken its origin in Owens College). It comprises two chief departments, a department of science, technology, and arts, including classics, modern languages, history, philosophy, mathematics, physics, chemistry, engineering, etc., and a well-equipped medical department. Other institutions are the Leeds Medical School (1894), Young Men's Christian Institution, a large training college for students for the Wesleyan ministry, and a literary and philosophical society. There is an admirable central library with several branches, the number of volumes being over 200,000. The charitable institutions of Leeds are numerous. Parks have been laid out by the corporation and recreation grounds, the chief being Roundhay Park (two miles from Leeds), 300 acres in extent and containing a lake of 33 acres. The fine ruins of

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Kirkstall Abbey (3 miles from Leeds), with the adjacent grounds, presented to the town by Colonel North in 1889, form an attractive resort. The waterworks supply Leeds with water from the Washburn, a tributary of the Wharfe, the daily available supply being 28,000,000 gallons.

Leeds is and has been for generations the chief seat of the woolen manufacture of Yorkshire and has become the seat of other important industries. Chief of these is the wholesale clothing trade, in which several thousand hands are employed, many being also employed in the steel-works, iron-foundries, rolling-mills, tool and machine factories; in the boot and shoe factories and the leather trade, and in the cloth-cap trade, which is also becoming a great branch of industry. There are also locomotive works, tobacco manufactures, color-printing works, extensive chemical and glass works, important works for the making of drainage pipes, fire-bricks, ornamental terra-cotta and pottery ware, etc. One of the great sources of the wealth of Leeds is its abundant supplies of coal and iron. Nearly 100 collieries are worked in the district. The history of Leeds extends over more than 1,200 years, the town being mentioned under the name of Loid or Loidis by the Venerable Bede as the capital of a small British kingdom about 616. It was made a city in 1893, and its mayor was raised to the dignity of lord-mayor in 1897. The vicinity is crowded with villages, most of the inhabitants of which are employed in manufacturing for the Leeds market. Pop. (1901) 428,953.

Leek, a mild European kind of onion (*Allium porrum*), much cultivated for culinary purposes, being often partially blanched by heaping up the earth about the stem. It is used in soups and otherwise, and is the more tender and succulent the richer the soil. The stem is rather tall, and the flowers are disposed in large compact balls, supported on purple peduncles. The leek is a Welsh national emblem. It was well known to the ancient Egyptians, Greeks and Romans. Several species of the genus grow wild in the United States, furnishing the wild leeks, wild onion, field garlic, etc., of the country folks. The cows eat these plants gratefully in the spring, and their milk and butter is tainted in consequence. Compare GARLIC.

Lee's Mill, Engagement at. Lee's Mill is a point on the Warwick River, in Virginia, near which occurred the first considerable collision of the Peninsula campaign. The Confederate forces under Gen. Magruder occupied the line of the Warwick, and between Lee's Mill and Wynn's Mill Cobb's brigade threw up intrenchments and constructed redoubts for artillery. On 16 April 1862 Gen. W. F. Smith, with his division of Keyes' corps, was ordered by Gen. McClellan to reconnoitre Cobb's position, stop his work and, if deemed judicious, drive Cobb from it. Brooks' Vermont brigade was thrown forward, and after an artillery fire of more than six hours, part of the time from 18 guns, four companies of the 3d Vermont crossed the stream below a dam and seized the rifle-pits of the 15th North Carolina, but were driven back with severe loss. The effort was renewed later in the day, when, under cover of a heavy artillery fire, which was sharply replied to, detachments of the 4th, 5th, and 6th

Vermont endeavored to cross the Warwick, but were driven back. The Union loss during the day was 156 killed and wounded, and 9 missing. The Confederate loss did not exceed 75 killed and wounded. The result confirmed McClellan in his conviction that the line of the Warwick could not be carried by direct assault, and he directed all his efforts to the siege of Yorktown (q.v.). Consult: 'Official Records,' Vol. XI.; Webb, 'The Peninsula'; 'McClellan's Own Story'; Allan, 'History of the Army of Northern Virginia.'

E. A. CARMAN.

Lee's Surrender. See FARMVILLE

Leeser, Isaac, American rabbi and journalist: b. Neuenkirchen, Prussia, 12 Dec. 1806; d. Philadelphia 1 Feb. 1868. In his 18th year he removed to Richmond, Va., where he at first engaged in business. In 1829 he became Hazan or minister of Congregation Mikveh Israel of Philadelphia. His first work, 'The Jews and the Mosaic Law,' appeared in 1833, followed in 1837 by his sermons in two volumes. He edited in 1841 'Grace Aguilar's Spirit of Judaism,' and began in 1843 his monthly magazine, 'The Occident,' which he conducted until near the end of its 25th volume. In 1845 he published his Pentateuch in Hebrew and English, and in 1848 his edition of the 'Daily Prayers,' according to the German ritual. Retiring from the ministry in 1850, he issued an English translation of Schwarz's classic 'Geography of Palestine,' and an edition of the Hebrew Bible, with Jaquett. He began now an English translation of the Old Testament, completed in later years. In 1857 he was elected minister of the Beth El Emeth Synagogue, but continued his literary labors, editing 'Dias Letters' (1859); 'The Inquisition and Judaism' (1860); 'Mrs. Hester Rothschild's Meditations and Prayers' (1864); Grace Aguilar's 'Jewish Faith and Spirit of Judaism' (1864). In addition to his work as editor, translator, author and lecturer, he gave the impetus to nearly every Jewish charity in the city, while he suggested institutions that have since been established, so far-sighted was his vision. He was for decades the leader of the conservative party in American Israel and was aggressive and fearless in his opposition to the reform movement, whose progress, however, he could not check.

Leete, William, English colonial governor of Connecticut: b. England 1603; d. 1683. He was destined for the profession of law, and after being called to the bar practised in the Bishop's Court at Cambridge, but attaching himself to the Reformed faith, joined the Puritans who were emigrating in great numbers to America, and reached the western continent in 1637. He made his home in the New Haven Colony in 1639 and became a religious leader in Guilford, which he had helped to found. From 1658 to 1661 he was deputy governor of New Haven. From 1661 to 1662 he was governor, at which latter date the colony was united with Connecticut by royal charter. He was deputy governor of the Colony of Connecticut from 1669 to 1676, when he was appointed governor, a position he held till his death.

Leeuwenhoeck, 15'vén-hook, or Leuwenhoek, Antonius van, Dutch naturalist: b. Delft 24 Oct. 1632; d. there 26 Aug. 1723. In early life he was engaged in mercantile pursuits, but

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applied himself during his spare moments to science, and attained the reputation of making the best microscopes in Europe. By his applications of the microscope, and researches in physiology, he attracted the attention of the Royal Society of London; and the greater part of his writings, containing accounts of his discoveries, were published in the English 'Philosophical Transactions.' He anticipated in his physiological discoveries much which has been confirmed in modern times. His assertions with regard to the circulation of the blood, the nature of the brain and nerves, and the structure of the crystalline lens, agree very nearly with the results of modern experiment. His investigation of the spermatic animalcules, which he claimed to have discovered in 1677, excited the curiosity of many naturalists, and they were afterward made the subject of much research and of many books by Buffon and others. Leeuwenhoek's life was passed in scientific research and in manufacturing optical instruments in his native city. His writings were collected and published in Dutch at Delft and Leyden. They also appeared in Latin (1695).

Leeuwin, lā'vīn or lē'wīn, **Cape**, the name of the point of land which is the southwestern extremity of Australia. It was named after the vessel Leeuwin, in which were the Dutch navigators who discovered in 1622 this part of the island. The light from the light-house can be seen 20 miles away. The place is subject to severe storms.

Leeward (lū'ard or lē'ward) **Islands**. See WEST INDIES.

Le Fanu, lē-fā'nū or lēf'a-nū, **Joseph Sheridan**, Irish journalist and novelist: b. Dublin 28 Aug. 1814; d. there 7 Feb. 1873. Having graduated from Trinity College, Dublin, he joined (1837) the staff of the Dublin University Magazine, at first as contributor, and afterward as editor and proprietor. Among modern Irish novelists he stands next in popularity to Charles Lever. 'The House by the Churchyard' appeared in 1863, and was succeeded by 'Uncle Silas' (1864), his most powerful work; 'Guy Deverell' (1865); 'The Tenants of Malory' (1867); 'The Wyvern Mystery' (1869); 'In a Glass Darkly' (1872); etc.

Lefebvre, **Jules**, zhül lē-fävr, French painter: b. Tournan, Seine-et-Marne, 10 March 1836. He was when a boy apprenticed to the trade of his father who was a baker, but his mother took pains to have him sent to Paris to study art, and he became the pupil of Léon Coignet. His 'Death of Priam,' exhibited in the Salon (1851) won for him the Grand Prix de Rome, since which he has gained many medals and honors. His 'Femme Couchée' in the Salon of 1868, a nude of singular freshness and power, established his reputation as an artist of the first rank, and the votes of the judges were divided equally between this picture and a painting of Corot's for the medal of honor, which was, however, bestowed on Brion. Among his best-known canvases are: 'Diana Surprised' (1879), purchased in the United States for \$7,000; 'Lady Godiva,' the Countess of Coventry, riding naked through the city—a painting also popularized by many reproductions; 'Psyche' (1883), now on exhibition as a loan in the Pennsylvania Academy of Fine Arts;

Psyche is represented with a star on her forehead, seated on a rock by the sea, and holding in her hands the fate of the world. 'La Vérite' in the Salon of 1870 attracted wide attention, and in recognition of its merits the painter was decorated with the cross of the Legion of Honor. 'Truth' is represented as holding aloft to the world a shining mirror. The action is impressive, the lines and proportion of the figure admirable, although the coloring is a little cold. As a painter of ideal heads Lefebvre has become widely popular. His 'Vittoria Colonna' is one of the most effective of these. But 'La Liseuse' (1889); 'La Poésie Antique,' 'Laure' and 'Violetta,' all exhibit the classic beauty, the repose and exquisite refinement of the ideal school. 'Clemence Isaure' is a study which is very human and life-like, the full lips and round chin suggesting physical life and passion while the bay leaves, with which the heavy locks of hair are wreathed, speak of poetic and intellectual power.

Lefebvre is one of the first of living French painters, and his influence is great in the Julien School where he is one of the instructors. Among the romanticists, classicists, realists and impressionists, he stands in the same class as Hector Leroux, Baudry, Bougereau, and Puvis de Chavannes, as an advanced idealist. Yet in opposition to such artists as Courbet, Manet and Bonnat, he is immensely popular, being in his love of ideal beauty and his refined technique, 'French of the French.'

Lefebvre, or **Le Fevre, Nicolas or Nicasius**, chemist, probably a native of France: b. about 1620; d. London 1669. He was educated at the Protestant Academy at Sedan, acquired a knowledge of chemistry and became his majesty's apothecary and distiller. Here Lefebvre found ample opportunity to pursue his favorite study. In 1660 appeared his 'Traité de la Chimie Théorique et Pratique,' which went through several editions, and was translated into German. In 1660 he was invited to London by Charles II. to take the post of royal professor and apothecary in ordinary to the household. He was also elected to the Royal Society, which had just been founded. In 1664 appeared a translation into English of his 'Traité,' entitled 'A Compleat Body of Chymistry.' His treatise on chemistry is compiled, according to his own account, from Van Helmont, Glauber, and Paracelsus, and is divided into the theory and practice of the art. The whole work is very well done, the author shows thorough familiarity with his subject, and his descriptions of apparatus, of substances, and of preparations are clear and systematic. His work served as a model for those of succeeding chemists, especially for that of Glaser, who replaced him in the Jardin des Plantes, and of Lemery.

Lefferts, Marshall, American engineer: b. Bedford, Long Island, 1821; d. 1876. After receiving a common school education he took up various occupations, finally settling down in the profession of electrical engineer, which he pursued from 1849 to 1860. During that time he was in the employ of the American Telegraph Company, and consulting engineer to the Atlantic Cable Company. He made many improvements in inventions in the department of electrical transmission while in the service of these companies. During the war he commanded the 7th

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regiment. In 1867 he became connected with the news department of the Western Union Telegraph Company; two years later, president of the Gold and Stock Telegraph Company, and in 1871 he took control of the commercial news department, which had been purchased by that company.

Leffmann, Henry. American chemist: b. Philadelphia 9 Sept. 1847. He was graduated from Jefferson Medical College in 1869, and from the Pennsylvania College of Dental Surgery in 1884. He was elected assistant professor of chemistry at the Philadelphia Central High School and served from 1876 to 1880. He was port physician 1884-7, and 1891-2, and in 1888 was appointed but not confirmed, coiner United States Mint, political reasons interfering. Since 1888 he has been professor of chemistry at the Women's Medical College of Pennsylvania and professor of chemistry at the Wagner Free Institute of Science. Among his works are: 'First Steps in Chemical Principles'; 'Compend of Organic Chemistry'; 'Compend of Chemistry'; 'Analysis of Milk and Water Products'; 'Sanitary Relations of Coal Tar Products' (from the German); 'Structural Formulae for the Use of Students.' He has edited Reese's 'Medical Jurisprudence and Toxicology' (4th and 5th editions), and 'Allen's Commercial Organic Analysis' (Vols. I and II, 3d edition).

Legal Education. Instruction in law schools is given by lectures, by recitations from text-books, and by discussion and explanation of selected cases. Each of these systems has its advocates. In a majority of the schools instruction is given mainly by lectures. Next in popularity comes the method of recitations on lessons previously assigned. There are only a few schools that depend mainly on the discussion and explanation of selected cases. Dean Ashley of the New York University Law School writes as follows on this subject: "The leading universities repudiate the idea of any fixed method for teaching or studying law." Prof. Gray of Harvard says: "In all law schools, I suppose, the students learn from text-books, cases and oral instruction. At any rate they do so here. Each teacher is free to use these means as he pleases. The different professors do actually use them in different ways and proportions." Dean Keener of Columbia says: "There is no uniform method of instruction in this school. Each instructor is at liberty to pursue the method of instruction which in his opinion will be productive of the best results." See EDUCATION, PROFESSIONAL, IN AMERICA.

Legal Tender. See FINANCE.

Legal-tender Cases, in American finance, a series of cases before the United States Supreme Court, involving the question whether certain acts of Congress declaring United States notes a legal tender in payment of all debts, public and private, were constitutional. The cases were first argued in December 1867, and decided in November 1869, by a divided court. Five members of the court decided in the affirmative and three dissented. In 1871 after a re-organization of the Supreme Court, the cases were again brought up for argument. Again the court divided, five judges upholding the constitutionality of the act and four dissenting. All the judges agreed that Congress had full power

to direct issues of paper money. In 1878 Congress decreed that legal tender notes which had been redeemed or received in the Treasury from any source, should be re-issued and kept in circulation. This latter act was assailed in the courts and the Supreme Court decided, with but one dissenting voice, that Congress had full power to make United States notes a legal tender in the payment of private debts in times of peace as well as in times of war. This decision closed all judicial action upon the subject. Consult: Thayer, 'Legal Tender' in Harvard Law Review (1887); Legal Tender Cases (110 U. S. 421, 1884).

Le Gallienne, lē gal'li-ēn, Richard. English author: b. Liverpool, England, 20 Jan. 1866. He was educated at Liverpool College and after several years spent in business served as literary critic for the 'Star' and settled in London. Since 1902 he has lived in New York. Among his numerous published works are: 'My Ladies' Sonnets' (1887); 'Volumes in Folio' (1888); 'George Meredith' (1890); 'The Book-Bills of Narcissus' (1891); 'English Poems' (1892); 'The Religion of a Literary Man' (1893); 'Prose Fancies' (1894-6); 'Robert Louis Stevenson and Other Poems' (1895); 'Retrospective Reviews' (1896); 'The Quest of the Golden Girl' (1896); 'If I were God' (1897); 'The Romance of Zion Chapel,' a novel (1898); 'Travels in England' (1900); 'Odes from the Divan of Hafiz' (1903).

Legaré, lä-gré', Hugh Swinton. American statesman: b. Charleston, S. C., 2 Jan. 1789; d. Boston, Mass., 20 June 1843. He was graduated at the College of South Carolina in 1814, and subsequently studied at Edinburgh University. After a tour of Europe he returned home in 1820, and two years later entered upon the practice of law. In 1821 he represented his native city in the State legislature, and in 1830 was elected attorney-general. In the same year he established the 'Southern Review,' a quarterly, with Stephen Elliott. In 1832 he was appointed chargé d'affairs at Brussels. In 1836, he returned to the United States, and was at once elected to the lower house of Congress, but while there failed to please his constituents and was not re-elected. In 1840 he was appointed by President Tyler attorney-general of the United States. He was a brilliant orator and debater, and his contributions to the New York 'Review' on 'Demosthenes,' the 'Origin of Roman Law,' etc., were marked by much literary ability.

Legazpe, Miguel Lopez de, mē-gēl lō-pāth dā lä-gāth-pā. Spanish soldier: b. Zumarraga, Guipuzcoa, about 1510; d. Manila, Luzon, 20 Aug. 1572. He was for several years chief secretary of the government of the City of Mexico and in 1564 was made commander of the Spanish forces sent to the Philippine Islands. He sailed from La Navidad, Mexico, in November 1564, and reached the islands in the following February. He took possession of several of the islands and founded San Miguel in Cebu, in May 1565; began the subjugation of Luzon in 1570, and founded the city of Manila in May of the next year.

Legend, originally a term applied to collections of biographies of saints and martyrs, or of remarkable stories relating to them. In the

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Middle Ages a collection of the lives of the saints was known by the name of *Legenda Sanctorum*, or *Historia Lombardica*. There is a celebrated collection, called the *Golden Legend* (*Aurea Legenda*), by Jacobus de Voragine, archbishop of Genoa, who died in the year 1298. It was translated into English by Caxton, and printed by him at the command of William, earl of Arundel, in 1483. Many of the mediæval legends were of an uncritical character, and along with true history often mingled much fable. In the course of time the legend came to mean only the fictitious parts of the story and became distinct from authentic history. It has now come to mean any unauthentic or improbable story handed down from ancient times. Legend is also used for the motto or words engraved in a circular manner round the head or other figure upon a medal or coin. The meaning of this term is similar to that of *inscription*; but the latter refers chiefly to the writing placed in the middle of the coin, while the legend surrounds it.

Legendre, Adrien Marie, à-drē-ōn mā-rē lē-zhōndr, French mathematician: b. Paris 18 Sept. 1752; d. Auteuil, France, 9 Jan. 1833. He was professor of mathematics in the military school at Paris and in 1783 became a member of the Academy. He was in 1787 employed by the French government with Cassini and Méchain, to measure a degree of latitude between Dunkirk and Boulogne, while English mathematicians did the same on the other side of the Channel, in order to determine the precise location of the observatories of Greenwich and Paris. In 1808 Legendre was appointed by the imperial government councillor for life to the university. He particularly distinguished himself by profound investigations as to the attraction of elliptical spheroids, and his method of calculating the course of the comets attracted great attention. His best known work is '*Éléments de Géométrie*' (1794; new edition, with additions and modifications by Blanchet 1845), which has been translated into English with notes by Sir David Brewster. He wrote also: '*Essai sur la Théorie des Nombres*' (1798); '*Nouvelle Méthode pour déterminer l'Orbite des Comètes*' (1805); '*Exercices du Calcul intégral, sur divers Ordres de Transcendantes et sur les Quadratures*' (1811-19); '*Traité des Fonctions elliptiques et des Intégrales eulériennes*' (1827-32); etc.

Léger, Paul Louis, pôl loo-ē lâ-zhâ, French scholar and author: b. Toulouse 13 Jan. 1843. In 1885 he was appointed professor of the Slav languages at the Collège de France, and has done much to awaken an interest in the history and philology of the Slav peoples by such works as: '*Slav Studies*' (1875); '*History of Austria-Hungary*' (1878), translated into English; '*Slav Tales*' (1882); '*The Save, Danube, and Balkan*' (1884); '*Bulgaria*' (1885); '*Russians and Slavs*' (1890); '*Russian Literature*' (1892).

Legerdemain, lēj-ér-de-mān', the art of performing tricks, or deceiving the human eye with apparent supernatural power. Legerdemain is usually carried on successfully by the aid of trick apparatus and machinery. Sorcery, enchantment, magic, necromancy, divination and perhaps astrology are in a sense all branches of legerdemain. For further details see MAGIC.

Leggett, lēg-êt, Mortimer Dormer, American soldier: b. Ithaca, N. Y., 19 April 1821; d. Cleveland, Ohio, 7 Jan. 1896. After graduating in medicine at Willoughby, Ohio, he studied law and was admitted to the bar in 1845. In the following year he was instrumental in organizing the first union free school system in Ohio. He was professor of pleadings and practices in Ohio Law College 1855-8, superintendent of the Zanesville (Ohio) public schools in 1858-62, and from 1862-5 served in the Federal army and was promoted to be major-general of volunteers in August 1865. From 1881 till his death he practised in Cleveland, Ohio.

Leggett, William, American journalist: b. New York 1802; d. New Rochelle, N. Y., 29 May 1839. He was educated at the college in Georgetown, D. C., and in 1822 entered the navy as midshipman, but resigned in 1826. He had in the previous year published a volume of poems, '*Leisure Hours at Sea, by a Midshipman of the U. S. Navy*', and in 1828 became editor of the '*Critic*', a weekly literary journal, soon united with the '*New York Mirror*', to which he contributed '*Tales by a Country Schoolmaster*' and '*Sketches at Sea*'. In 1829 he became one of the editors of the *New York Evening Post*, to which journal he was attached until 1836. He then commenced a weekly journal called the '*Plaindealer*', which attained a large circulation, but was soon discontinued through the failure of its publisher. In May 1839, he was appointed by President Van Buren diplomatic agent to Guatemala, but died suddenly while preparing for his departure. His '*Political Writings*', with memoir by Theodore Sedgwick, appeared in 1840. Leggett was remarkable among the journalists of his day as an unflinching advocate of freedom of opinion for his political opponents as well as for the men of his own party.

Leggett's, or Bald, Hill, Battle of, an engagement of the Civil War, near Atlanta, Ga. The battle of Peachtree Creek (q.v.), 20 July 1864, was a Confederate defeat. On the 21st Gen. Sherman advanced strong skirmish-lines to within about two miles of the works surrounding Atlanta. In the morning Leggett's division was ordered to carry a high, bare hill, situated about half a mile south of the Decatur railroad. Supported on the right by Giles A. Smith's division, Leggett advanced under cover of the hill itself, dashed forward when reaching its base, drove Cleburne's Confederates from it, and began to intrench. The Confederates made several vain efforts to retake it. From its summit Atlanta was in full view. Discovering at daybreak of the 22d that the advanced Confederate works had been abandoned, Sherman ordered a general advance along his line to occupy the city, and the movement began accordingly. During the night, however, the Confederate Gen. Hood had abandoned his advanced lines on the left and ordered Hardee's corps of four divisions to march entirely past Sherman's left and attack his left and rear. Giles A. Smith's division of Blair's Seventeenth corps held Sherman's left and Dodge's Sixteenth corps was some distance in rear of the centre of Blair's corps, and perpendicular to it. Blair fronted west, Dodge south.

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About midnight Hardee moved out of Atlanta by the McDonough road, and about day-break, when the troops had made a night march of 15 miles, and passed beyond Sherman's left, he halted, formed line, and gave his men needed rest. In half an hour the order was given to advance, and his corps went forward until Bates and Walther's divisions came to open ground, where they received a most deadly fire from Dodge's two Union divisions, which held them in check. Every effort to advance was repulsed with great loss, and Gen. Walther was killed. On the Federal side Gen. J. B. McPherson (q.v.), commanding the Army of the Tennessee, hastened troops to fill an interval between Dodge and Blair, rode to Dodge, and then toward Blair's line, and had gone but a short distance when he fell mortally wounded, being succeeded in command by Gen. John A. Logan. Meanwhile the left of Hardee's line had enveloped Giles A. Smith's division, attacking it in front, flank, and rear, Smith gradually yielding ground and refusing to connect his left with Dodge's right, the Confederates gradually advancing to the foot of Leggett's Hill. When Hardee's attack on Sherman's left and rear was being delivered, Hood ordered Cheatham's corps to attack in front, and the attack fell upon Leggett's Hill and the Fifteenth corps on the right of it, just as Leggett had repulsed an attack in his rear. Leggett, by desperate fighting, held his ground. The Confederates made repeated attacks until nightfall, when Hardee withdrew his right wing, leaving his left connected with the intrenched line in front of Atlanta. On the right of Logan's corps the Army of the Ohio was attacked by Smith's Georgia militia, which was readily repulsed. On Hardee's right Wheeler's cavalry attacked Sprague's brigade in Decatur, and for a time pressed it vigorously, but Reilly's brigade of the Army of the Ohio coming to its assistance, Wheeler was repulsed. The battle of Leggett's or Bald Hill was one of the greatest of Sherman's Atlanta campaign, and involved four corps of his army and two of Hood's. The loss of the Army of the Tennessee was 430 killed, 1,559 wounded, and 1,733 missing, with 10 guns; the entire Union loss during the day was about 4,000. The Confederate loss is not known; it has been variously estimated at from 6,000 to 10,000; it was probably between 5,000 and 6,000. Consult: 'Official Records,' Vol. XXXVIII.; Cox, 'Atlanta'; Sherman, 'Personal Memoirs,' Vol. II.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

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Leghorn, lēg'hōrn or lēg'hōrn' (It. LIVORNO, lē-vōr'nō), Italy, a walled city and a seaport, in Tuscany, on the Mediterranean. It is the capital of the province of Leghorn. It is about 200 miles northwest of Rome and 60 miles west of Florence. It is a well built and clean city; the north part called Venezia Nuova, is intersected by canals along which are warehouses and stores. Leghorn has an inner and outer harbor and a good roadstead. Neither harbor will accommodate the largest vessels. In the outer harbor is a lighthouse, built in 1303. Some of the manufactures are straw hats (originally the famous Leghorn hats), leather, woolen caps, glass, paper, soap, coral ornaments, etc. Shipbuilding is one of its important industries.

The chief exports are olive oil, borax, wine, marble, quicksilver, candied fruit, hemp, hides, soap, raw silk, etc. The chief imports are sugar, cotton, coal, tobacco, grain, spirits, and petroleum. In the middle of the 16th century Leghorn had less than 800 inhabitants; but about this time it became a free port, the first one on the Mediterranean. After the decay of Porto Risano, a neighboring city, Leghorn grew into importance. Many of its ancient churches and dwellings are now in a good state of preservation, and are visited annually by many tourists. Some of the educational institutions are the Royal Commercial Marine Institute, the Royal Marine Academy, a library with over 60,000 volumes, a number of academies and seminaries. There are many charitable institutions for the sick and the poor, and for orphans. Leghorn is a popular summer resort, and its connection by electric lines with the bathing places and with beautiful villages in the vicinity make it a most desirable place of residence at any season of the year. Pop. (1901) 98,321.

Leghorn, a breed of domestic fowls. See **POULTRY**.

Leghorn Hats, hats made in Tuscany from straw-plait obtained from bearded wheat cut green and bleached. They are so called because imported from Leghorn.

Legion, in ancient Roman armies, a body of infantry consisting of different numbers of men at different periods, from 3,000 to above 6,000, often with a complement of cavalry. Each legion was divided into 10 cohorts, each cohort into three maniples, and each maniple into two centuries. Every legion had 60 centurions, and the same number of optiones or lieutenants and standard-bearers. The standard of the legion was an eagle.

Legion of Honor (*Légion d'Honneur*), a French order for the recognition of military and civil merit, instituted by Napoleon while consul 19 May 1802, and inaugurated 14 July 1804. The decoration originally consisted of a star containing the portrait of Napoleon surrounded by a wreath of oak and laurel, with the legend, 'Napoléon Empereur des Français'; on the reverse was the French eagle with a thunderbolt in his talons, and the legend, 'Honneur et Patrie.' The order has been remodeled several times. There are now five ranks or classes: ordinary chevaliers or knights, officers, commanders, grand-officers, grand-crosses. The profuse granting of the decoration of the order latterly brought the institution into discredit, and the number of chevaliers is now restricted to 25,000, the officers to 4,000, the commanders to 1,000, the grand-officers to 200, and the grand-crosses to 70. The star now bears a figure emblematic of the republic, with the inscription, 'République Française 1870,' on the reverse two flags, with the inscription, 'Honneur et Patrie.'

Legislation, or **Law-making**, a subject which naturally divides into four branches: the nature of its sanctions, or in other words the body from which it emanates; the methods of preparing and enacting it; classification by its subjects, as organic, general, special, or local; and by its objects, as substantive or constructive, and remedial or punitive.

i. The final sanction of any law must be the major part of the organizable force in a com-

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munity; since a law without force to compel obedience is mere counsel from an advisory body or the expression of an opinion, *brutum fulmen*. But the source which promulgates it need not be, as in modern states it usually is, an expressly constituted legislative body. The law may be an edict from a monarch; or a decree from an administrative council; or (as with State constitutions in general) the work of a popular convention, itself now usually called by a legislative body, but originally (see CONVENTION) the expression of the popular will through its leaders, not disowned by the people; or by judges who practically make new legislation by construing the old. A broad distinction between the United States and the continent of Europe in this respect is, that in the constitutional governments of the former, a large part of the work which loads the State and national legislatures here is done by administrative orders with the force of law. Each minister in the great departments of state promulgates executive decrees, of a sort which are classed as legislation and taken charge of by legislatures here (to the exhaustion of their time and energies needed for broader care over the public interests): city charters and county and town governmental regulations are there counted as administration, not legislation.

2. When entrusted to regular legislative bodies, the methods of imposing it on the community are practically divided into two, corresponding to Mr. Bagehot's classical division of governments into cabinet and presidential; or still more accurately, the difference as legislative bodies is between one supreme committee and an aristocracy of theoretically equal committees, of which some are grandees (see CONGRESS). In the former, the grand parliamentary committee called the cabinet initiates nearly all legislation, of its own motion or by adoption of outside proposals; shapes it under fire of discussion (in which the ministers take part), and dictates when it shall be voted on; and stands or falls with the general success of its measures. In the second or congressional method, also used in the State legislatures, each member introduces whatever bills he chooses; they are referred to committees, standing or special, who report and make recommendations on them (or not) at will, and those interested in their passage secure a vote when and if they can. The immense mass of projected legislation poured into legislatures under our system compels the most rigid rules as to all the stages of this process,—form, presentation, reference, readings, record, motions, balloting or ayes and noes, etc. In practically all our States the executive has a qualified veto on legislation (see EXECUTIVE). Much in favor now is the Referendum (q.v.), which throws the final responsibility on the people; but in no case have the results justified any confidence in it as an improvement.

3. Organic laws are those which form the working basis of an independent (or locally autonomous) community, assign rights and duties of sovereign and subject, distribute and delegate powers. These form the source of authority for all the working bodies which put into effect the organic provisions; to them, therefore, must be referred all questions as to the scope of their delegated powers, by legislatures and executive bodies. All that contravenes this organic law is "unconstitutional." From its

fundamental and far-reaching nature, it is always made difficult of change; and for the same reason, incessant and too often successful efforts are made, by over-zealous reformers, to foist into them all sorts of legislative measures so opposed to the wishes of a large section that speedy repeal is feared if not so intrenched. General legislation is that which affects the interest of the whole community, or if it practically affects special sections, does so by the chance of localized interests. The rules which should guide this are outside our province. Local legislation, that relating to particular municipalities or other State subdivisions, blends so indistinguishably with special legislation—that relating to specific individuals, companies, interests, etc.—that the evils are one, and the attempted restraints are of one sort. The latter (special) is of course far the most fertile source of direct pecuniary corruption, and much more abundant; but the "hold-ups" of municipal interests, or laws interfering with their government or finance, etc., have been and remain great sources of corruption also, for large money interests are often affected by them. So great have been the evils of this that many States have amended their constitutions to prohibit or restrain it; but in the case of municipalities, this is regularly, though with more than doubtful constitutionality, evaded by dividing a State into "classes," with but one in each class, and passing laws for the class. Special legislation for individuals or corporations can only cease with the abdication of legislative power over business; and the attempt to forbid it results in the worst class of it,—namely, the modification of general law to suit special interests.

4. Substantive or constructive legislation is that creating or defining rights and duties, or assigning powers; with this must always go, to make it a law, the provision of a penalty for disobedience, or at least a provision for enforcing obedience which implies the imposition of penalties already legal. The command or the permission to do something, in fact, implies a menace in case it is not done or the permission is interfered with. Destructive or amendatory law is the abolition of former laws; and a large part of the work of every legislature consists in undoing the work of its predecessors. But as this involves either passing others instead, or leaving in force still others, if nothing but the common law,—a mixture of legislature-made and judge-made legislation,—it belongs to the constructive order, paradoxical as it seems. Remedial legislation provides protection or remedies for wrong; this too needs its punitive accompaniment to be of any effect.

Legislature, in the United States, the law-making body of one of the States; in general, the law-making body of any constitutional state. The name always implies that there is not an autocracy promulgating self-validated decrees, but a body of representative citizens, who act for the entire citizenship in framing or consenting to their laws. It has been stated under LEGISLATION that laws need not emanate from an express legislative body; but in some shape all free modern states have such a body. The subject divides into four chief branches: (1) The origin and history of the body, and the general outcome; (2) the legal sources of its power and the methods of selecting it; (3) the

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extent and limits of its powers, its methods, and its periods; (4) the qualifications, tenure, and rights of its members. The first and second intertwine.

1. The original legislative bodies, like the Greek ecclesia and the Roman senate, were executive and administrative bodies also; public business was not yet differentiated. Under the empire, as the imperial power grew and the senatorial dwindled, legislation was confined to codes promulgated by the emperors, plus judge-made law. In the mediæval states, the king or prince was generally the fountain of legislation; but the Teutonic assembly, representing popular co-operation, survived in the favorable location of England, as the Witenagemot of the Saxon kingdoms. The Norman and Angevin kings replaced them with a council of leading nobles and clergy; but in the struggles with Henry III., Simon de Montfort called in the representatives of the towns. His system perished with him; but Edward I. revived it, for the sentiments of the chief sources of the royal supplies could not be disregarded. After asserting a check on one administrative department after another, the popular body wrested from the privileged orders first a share in and finally a monopoly of legislative action. The inviolability of its members, long claimed, was established against the Stuarts; the right to decide on the qualifications of its members was established against George III. by the Wilkes case. The separation of executive, judicial, and legislative functions, involved in this process,—since a representative body in a great state is unfit for the first two, though in the little Greek city-states they were combined,—had become a fixed principle of English public life by the 18th century, and was transferred to the English colonial governments. That nearly all had two chambers was due to the accident of the English parliament having that constitution; they were not due to the theory of "checks and balances," which on the contrary was evolved from the working of the parliamentary system. This system, nevertheless, commends itself by reason and experience, to prevent hasty or factious legislation, especially from great waves of popular feeling; and is used in nearly all legislative bodies. In part, this is because all other parliamentary systems, as the countries have emerged from absolutism or dependence and undertaken constitutional life, have been copied from those of England or the United States. This copying extends to all the general forms, and often mimics unessential details under entirely different circumstances from those which generate the originals. Thus, not only in the Congress but even more needlessly in the State legislatures, the lower house only (see *HOUSE OF REPRESENTATIVES*) can originate money bills; though both houses are equally popular bodies, and the English provision was part of a warfare between nobles and commons. The upper or less numerous house is also usually invested with the confirmation of treaties and appointments, and sometimes with some administrative functions; in the Congress the House prefers impeachments and the Senate tries them, and the States have copied this.

2. The old legislatures represented "estates" or orders of the state, the three great ones being nobles, clergy, and commons. The English parliament still does so, except that the first two are merged in one house and vote as one, in-

stead of separately as formerly. In essence this is the obvious and proper form of representation (by the great classes of interests and sympathies); but in a country where there are no classes, there is but one to represent, the whole people, and universal suffrage with popularly nominated candidates is the only workable method. Even where there are such, this method is general for the lower houses; but efforts are almost everywhere made to restrict the body of electors somewhat, and bar out the most ignorant, dangerous, or corruptible class. Property-holding or tax-paying are common, and educational requirements are much used, but not always for their avowed objects. The upper houses are sometimes chosen directly, as in the United States of Mexico and Brazil, but from larger districts than the lower, sometimes at large; sometimes indirectly, as in the United States and France; sometimes appointed, as in Germany, Switzerland, and Canada. In still others, it is neither elective nor appointive, but a mixture of hereditary and *ex officio*, or both, as in Great Britain and Austria-Hungary; sometimes a mixture of hereditary and elective, as in Prussia; sometimes of hereditary and appointive, as in Italy.

3. Legislatures may be divided according to their powers, into limited and omnipotent. The United States is the chief exemplar of the former; Great Britain and France represent the latter. Not only the State legislatures, but Congress, are limited to passing such laws as do not conflict with the Constitution, as interpreted by the Supreme Court; the States are still further bound by their State constitutions; and in both, President or governor can compel a reconsideration and a heavier majority. The enactments of most European parliaments are substantive law as soon as passed, with no superior authority; the English sovereign has a theoretical veto which he cannot use, the French president has none. In methods, all legislatures are hedged in by a great body of rules of their own making, found needful by experience; the choice and powers of the speaker, the appointment of committees, the method of introducing and acting on bills, the regulation of debate, the communication between the two branches and between either and the executive, the treatment of petitions, and many other matters, cannot be left to continual warfare. These rules are of great number and complexity, and throw the control of business entirely into the hands of experts (see *CONGRESS*): it has been said that a member of Congress needs an entire session to learn the rules sufficiently to take any effective part, and much of the time of all is spent in debating their application. A very important limitation is that on the freedom of debate by the American "previous question," French *clôture*, English "closure," in other governments "urgency of public business"—all are the same, and nearly all popular parliamentary bodies have been compelled to adopt it; the United States Senate being a conspicuous exception, and Great Britain a late and reluctant accession. Without it, the entire system of "government by discussion" may be made unworkable by a small knot of members playing tricks with the rules; with it free debate may be stifled, but the evil is the less of the two. Procedure must be open, save in "executive sessions" to make appointments. The matter of a quorum is settled by each for

itself, usually as a majority of the elected members; each also decides what shall constitute a majority vote, whether of members elected or members present. The former power of many legislatures to dissolve themselves has been everywhere restrained: in the States by limitation of term and of the frequency and length of sessions (usually now to biennial sessions, and often to 60 days, on a rather ludicrous theory); in Great Britain by limiting the length of a Parliament to seven years. The upper house in Congress and most States is made a continuing body, by so arranging the terms that only a part are elected on any one occasion.

4. The qualifications for the lower house are invariably citizenship; usually (though with growing exceptions) male sex; an age generally (though not always) higher than the voting age, usually 25, sometimes more; if a State of the Union, technical residence therein, and, by a custom with the force of law, residence in the district of election. Crime and pauperism are invariable disqualifications, and sometimes bankruptcy. The upper house in addition to these has almost invariably (except in the United States) a higher age limit, from 30 up to 40; often a property qualification; and when appointive, they are almost invariably from the upper business or professional ranks. The tenures are always much longer in the upper house than the lower: nowhere less than six years, nine in some, for life in many European states — save that in Germany and Switzerland they can be terminated at the will of the local governments that make the appointments. In the lower house it is from a minimum of one to a maximum of three, except in Great Britain, where it is for seven unless the Parliament is sooner dissolved. In all legislatures, the members are exempt from civil process while in actual session, even during journeys to and from home at recesses.

Légitime, François Denys, frān-swā dē-nē lä-zhē-tém, Haitian general: b. 1842. During the administration of President Salomon, he was accused of aspiring to the presidency, and accordingly went to Kingston, Jamaica, remaining three years, then returned to Haiti at the invitation of his followers, and on 7 Oct. 1888 was elected president of the provisional government. Gen. Thélémaque denounced the election as a job, and attempted to make himself president, but he was killed in the battle which ensued. Légitime was elected president of Haiti 17 Dec. 1888, but resigned in 1889, owing to the opposition of Gen. Hippolyte, and again retired to Jamaica. In 1896 President Sam granted a general amnesty, and he returned to Haiti.

Legouvé, Gabriel Ernest Wilfrid, gä-brē-ĕl ér-nă vél-frid lé-goo-vă, French dramatist and miscellaneous writer: b. Paris 15 Feb. 1807; d. 14 March 1903. In 1827 he won a prize of the Academy with a poem on the art of printing, 'Découverte de l'Imprimerie.' While instructor in the Collège de France 1847, he lectured on the history of woman's development; and later published: 'Moral History of Women' (7th ed. 1882), and 'Woman in France in the 19th Century' (1864). These works were received with great favor, and were followed by 'Science of the Family' (1867), and 'Messieurs the Young Folk' (1868). Meanwhile Legouvé was winning high distinction as a playwright with 'Louise de Lignerolles'; 'Adrienne Lecouvreur'

with Scribe (1840); 'Medea'; 'By Right & Conquest'; 'Miss Suzanne' (1867); 'Anne d'Kerwiler' (1870); 'Consideration'; etc. In 1882 he published: 'Recollections of Six Years,' and in 1890 'Winter Flower, Winter Fruits: Story of my Household.' In 1885 he became a member of the French Academy.

Legros, lē-grō', Alphonse, Anglo-French artist: b. Dijon, France, 8 May 1837. In 1851 he exhibited for the first time in the Salon, but finding small encouragement in France he removed to London in 1863, became a naturalized Englishman, and was appointed in 1876 professor at the Slade School in University College. His work, alike in painting, etching, and modeling, is strongly mannered, and as a colorist his range is somewhat limited. His more important pictures are the 'Anglers,' the 'Pilgrimage,' the 'Spanish Cloister,' the 'Benediction of the Sea,' the 'Baptism,' and the 'Coppersmith.' His etchings will prove in all probability his most enduring work, among the most noteworthy being his 'Death and the Woodman,' and 'Le Repas des Pauvres,' both marked by a fine breadth in conception and handling. His portraits are also of value.

Legu'min, or vegetable casein, a protein substance analogous to the casein of milk, obtained from beans, peas, lentils, vetches, and other leguminous seeds; the principle of the *Leguminose*.

Legumino'sæ, a natural order of herbs, shrubs, and trees widely distributed in all climates but most numerous in tropical and subtropical regions; growing upon all kinds of soil; exhibiting a great range of habit from creeping annual to climbing shrub; useful for a great variety of purposes — ornament, food, timber, fodder, and in the arts; and constituting the second largest family of plants, about 7,000 species distributed among about 450 genera. The species are characterized by alternate, stipulate, usually compound leaves; papilionaceous or sometimes regular flowers commonly arranged in racemes; monadelphous, diadelphous or occasionally distinct stamens, typically 10, surrounding a single simple pistil which generally becomes a pod or legume containing one to many seeds.

The species naturally fall into three sub-orders: (1) *Papilionaceæ*, with flowers resembling a butterfly; (2) *Casalpincæ*, with imperfectly or not at all papilionaceous corollas, which may sometimes be nearly regular; (3) *Mimosæ*, with small, regular flowers. The first group contains more than two thirds of the species. Its members are adapted for insect fertilization, especially by bees, which alight upon the lower petals, brush against the pistil which is thrust out by the insect's weight, then come in contact with the stamens and finally carry the pollen, which has been discharged, to other flowers. Thus the pistils receive pollen from stamens not in the same flower with them. In some instances they may also obtain pollen from these stamens, thus having a double chance to be fertilized. (See FLOWERS AND INSECTS.)

Perhaps the most interesting trait found in the order is the power possessed by the species of obtaining free nitrogen from the air by means of the tubercles or wart-like excrescences upon their roots. These tubercles are the homes of bacteria which have gained entrance to the

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plant's tissue through the root-hairs; and are thus the result of irritation. The plants, it is believed, furnish the bacteria with carbohydrate food in return for the nitrogenous material prepared by them, thus exhibiting excellent examples of symbiosis (q.v.). Largely owing to this reciprocal action the legumes are valued as green manures, a fact long acted upon but unexplained until the last quarter of the 19th century, when Hellriegel and other investigators proved it, and even went further to show that soils poor in the bacteria could be inoculated profitably. See CLOVER; NITROGEN; ROOT-TUBERCLES; GREEN MANURING; VETCH; COWPEA; BEAN; LUPINE; ACACIA; LICORICE; INDIGO; SWEET PEA; MEDIC; LABURNUM; TAMARIND; MIMOSA.

Lehigh, lē'hi, a river of Pennsylvania which has its rise east of Wilkesbarre, in Luzerne County, and flows nearly south to a point about 12 miles below Mauch Chunk, where it breaks through the Blue Ridge. From here its course is southeast to Allentown, then northeast to Easton, where it enters the Delaware River, after a course of about 120 miles. In its upper course it is a rapid and picturesque mountain stream, broken by several falls. It passes through a rich coal and iron ore region, and serves as an outlet for the products of the mines. It was made navigable by a series of extensive improvements to Whitehaven, 84 miles from its mouth. The Lehigh Valley is famous for its beautiful scenery as well as for its valuable iron ore and anthracite coal deposits.

Lehigh University, an institution at South Bethlehem, Pa., founded by Asa Packer (q.v.), in 1865. He donated the land, 115 acres, upon which the buildings were erected, and \$500,000. At his death he bequeathed \$2,000,000, making in all a gift of about \$2,600,000. The object the founder had in establishing such a school was to give the young men of the Lehigh Valley an opportunity to acquire a complete education, technical, literary, and scientific, suitable to fit them for those trades and professions represented in the development of the peculiar resources of the rich mining territory in which it is located. The institution was incorporated in 1866 and its first class was graduated in 1869. It has six courses in the school of technology: civil engineering, mechanical engineering, metallurgy, mining, electrical engineering, and chemistry, leading to the degree of B.S. The school of general literature has a Latin-scientific course and a classical course, leading to the degree of B.A. Summer schools in the engineering courses are given each year. The master's degree in arts and science may be obtained by means of the graduate courses. The four years' course in metallurgical engineering leads to the degree of Metallurgical Engineer; and the four years' course in mining engineering leads to the degree of Engineer of Mines. Students have the advantage of frequently and regularly visiting the mines. The Bethlehem Steel Company and the Lehigh Valley Coal Company give the students many opportunities of study, especially when accompanied by an instructor. There are 14 college buildings: Packer Memorial Church, Packer Hall, laboratories, the Sayre astronomical observatory, a gymnasium, and other buildings which make a valuable group. The income is derived from the endowment fund

and tuitions. In 1903 the productive fund was \$1,250,000 and the income \$100,000. Some assistance has been received from the State. Connected with the school, in 1903, were 50 professors and instructors, and nearly 600 students. The library contains about 118,000 volumes. The graduates number (1903) about 1,200.

Lehighton, Pa., borough in Carbon County; on the Lehigh River, and on the Central of New Jersey and the Lehigh Valley R.R.'s; about 75 miles northeast of Harrisburg, the capital of the State, and 70 miles, in direct line, northwest of Philadelphia. It is a trade centre for a mining section of the county. Its chief manufactures are car-springs, flour, leather, stoves, furniture, brick, and mining tools. The borough owns the electric-light plant, but leases it to a private corporation who operates it. Pop. (1890) 2,959; (1900) 4,629.

Lehman, lā'man, Rudolf Chambers, English journalist, lawyer and authority upon rowing: b. near Sheffield, England, 3 Jan. 1856. He was educated at Cambridge and became a barrister of the Inner Temple in 1880. He has been a member of the staff of 'Punch' from 1890 and was editor of the London *Daily News* in 1901. He coached the Harvard crew in 1896 and 1897 and was given a dinner by the Harvard Club of New York on 10 April 1897. He has published among other works: 'In Cambridge Courts' (1891); 'Mr. Punch's Prize Novels' (1893); 'Isthmian Library: Rowing' (1897); 'Anni Fugaces,' verse (1901); 'Adventures of Picklock Holes' (1901).

Lehmann, lā'män, Lilli, German operatic singer: b. Würzburg 1848. Her mother, who was harp-player and prima donna under Spohr at Cassel, gave her the first musical instruction, and under her training Fräulein Lehmann developed a remarkable soprano voice. She made her début in Berlin (1870) and subsequently produced so good an impression that she was appointed imperial chamber singer in 1876. She became famous from the parts she took in the Nibelungen trilogy at Bayreuth, and sang in Wagner's operas in London (1884), and as principal soprano in the same operas at the Metropolitan Opera House, New York, her principal roles being Brünnhilde and Isolde.

Lehmann, Liza, English singer and composer: b. London. She is a daughter of Rudolf Lehmann (q.v.). She studied vocal music at London and Rome, and composition under Freudenberg and Hamish McKunn. On 23 Nov. 1885 she made her début in London; her success was assured, and she was received well throughout Great Britain and Germany. In 1894 she retired from public singing on her marriage with Mr. Herbert Bedford, a well-known composer. She devoted herself henceforth to composition and has produced works of freshness and originality, many of them tinged with a refined feeling which recalls the modern German romantic or emotional school. Her most successful works are the 'Persian Garden'; and 'The Daisy Chain' (1901).

Lehmann, Rudolf, Anglo-German painter and writer: b. near Hamburg 19 Aug. 1819. He was educated at the Johanneum, Hamburg, and proceeding to Paris studied painting under his brother Henry Lehmann; he was afterward the pupil of Cornelius and Kaulbach (q.v.) at

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Munich. He went to Rome in 1839 and remained there 16 years. His largest picture is 'The Blessing of the Pontine Marshes by Sixtus V.' which was bought by the French government after being exhibited in France 1846. In 1866 he settled in London, and became a successful portrait painter. He has published: 'An Artist's Reminiscences' (1894); 'Men and Women of the Century' (1898).

Leib, lib, Michael, American politician: b. Philadelphia 1759; d. 1822. He was sent to the State legislature, and to Congress in 1798, where his pronounced political opinions made him conspicuous. Re-elected in 1800 and again in 1802, he opposed the administration of Jefferson, whom he had at first supported, and was politically associated with William Duane (q.v.) who published the 'Aurora.' Returned to Congress in 1804, he there vigorously opposed Gallatin and entering the Senate in 1808 was there especially hostile to both Madison and Gallatin. He left the Senate in 1814 to become postmaster of Philadelphia.

Leibnitz, Gottfried Wilhelm, göt'frēd vil'hēlm lib'nits, German metaphysician: b. Leipzig 21 June 1646; d. Hanover 14 Nov. 1716. From his earliest years he gave indications of remarkable genius and inherited from his father, who was a professor of moral philosophy, a love of historical study, and a taste for metaphysical speculation. In his sixth year his father died and he was removed from the Nicolai school at Leipzig and set free in his father's library. He soon ran through the ordinary German historical books and taught himself Latin by reading an illustrated edition of Livy. Before his 12th year he could translate Latin easily, and had begun Greek. In 1661 he entered the University of Leipzig. Here he became acquainted with the works of modern philosophers and mathematicians from Bacon to Descartes. In 1666 he was refused the degree of doctor of law on account of his youth, but immediately afterward received it from Altdorf, on which occasion his dissertation was so brilliant that a professorship was offered him, but he declined the position. The same year he visited Nuremberg, the centre of Rosicrucianism which he made the subject of profound study. At Nuremberg he met a former first minister to the elector of Mainz, and this led to his introduction to the elector himself, who subsequently employed the pen of the philosopher in furthering his own political plans. At that time Germany was threatened by France on the west and Turkey and Russia on the east, but even the sagacious arguments of Leibnitz failed to set a German prince on the throne of Poland (1669) or to induce Louis XIV. to send an expedition to Egypt, ostensibly for the purpose of crippling the commerce of Holland, but really in order that the armies of France might be diverted from attacking Germany. It was the discovery by Napoleon of Leibnitz's letter on this subject (1803) that led to the First Consul's futile campaign in the Nile Valley. But the negotiations on this subject had an important result in sending Leibnitz to Paris, where he made the acquaintance of Arnauld, the Port Royalist, Huygens, the Christian physicist, and Malebranche, the mystic psychologist. From Paris he went to London (1673) where he was elected fellow of the Royal Society. His studies

in mathematics meanwhile resulted in the discovery of differential calculus. The discovery was claimed also by Newton, but it would appear, as in the case of Wallace and Darwin, that two great minds working independently on parallel lines had simultaneously arrived at the same conclusions. In 1676 Leibnitz was invited by the Duke John Frederick of Brunswick-Lüneburg to take charge of his library in the palace at Hanover and to employ himself in writing the history of the Brunswick-Lüneburg family. While thus engaged he found time to compose his 'Systema theologicum' (1686) in which he attempted to discover a common ground in the details of belief for the Roman and Reformed Churches. He also corresponded with Bossuet on this subject. He removed to Berlin in 1700, and founded the academy of which he became president for life. At that date began his intimacy with the electress Sophie Charlotte of Brandenburg, and her mother, Princess Sophie of Hanover. For five years Leibnitz enjoyed the friendship and intellectual society of the former, and her death in 1705 was a blow from which he never recovered. In 1712 at Vienna Leibnitz, who was strangely covetous of honors, was made imperial privy councillor and baron of the empire.

During the last 30 years of his life he was a laborious writer. Not only was his history of Brunswick completed, though fated to be unpublished until 1843, but he left scarcely any subject untouched by his tireless pen. Theology, jurisprudence, mathematics, metaphysics, history, politics, economic science and philology became in turn subjects of his comment. While his greatest claim as a thinker is based upon his philosophic system he has never stated his views in a single coherent treatise. In 1696 he made a clear utterance on some important points in replying to Locke's 'Essay on the Human Understanding.' In 1710 appeared what we may call an exposition of his philosophy from the deistic standpoint, 'Essais de Théodicée sur la Bonté de Dieu, la Liberté de l'Homme, et l'Origine du Mal.' In 1704 he stated his theory of physics in his 'Monadologie,' a modification of Democritean atomism. He spent his last days in utter neglect, tortured by disease, forgotten by his friends and still grieving for the loss of the only woman he had ever loved. He was buried without any religious office and with only a single mourner to watch the grave close over one of the greatest men in the intellectual world of modern times.

Leibnitz in private life was almost secluded from the world. He was somewhat unfitted for social intercourse by his irritability and dislike of contradiction, though in the discussion of large questions or problems he was tolerant of other men's views and eager in acquiring information from any person. While almost ascetic in his control of appetite, he has been charged with avarice, and it would sometimes seem as if his thirst for temporal honors and public recognition was beneath the dignity of his truly gigantic mind. In philosophy Leibnitz may be classed with the Cartesians. If, as Coleridge says, 'Every man is either an Aristotelian or a Platonist,' Leibnitz was a Platonist. He comes in conflict with Locke on the subject of knowledge and denies that the mind is *tabula rasa*, but perhaps his views may best be summarized

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under the three familiar terms of his philosophic system. The first is what he calls the principle of Sufficient Reason. The meaning of this phrase seems to be, that there are two kinds of human cognition, that of intuition, which applies to truths that are self evident, such as the fact of identity, as, John is John, and that which relates to the content of John and asserts something more than his self evident identity. The content of John consists of facts to be proved, such as his character, his intellectual power, his natural disposition. Unless the statements concerning these things can be proved true they are not true. Leibnitz here makes a distinction between the analytical and synthetical sciences, and maintains that by the application of the Sufficient Reason, the higher sciences which are synthetical can be placed on as solid a basis of truth as those which are merely analytical, and based on the recognition of identity. It is in this way that he would build up speculative knowledge whether physical or metaphysical. Leibnitz revived the profoundest discovery of Greek philosophic subtlety, when he propounded his atomism or "monadology" as he calls it. But the atoms of Democritus were merely material, those of Leibnitz are spiritual-self-determined beings, the highest of which is God. These atoms, he says, have neither parts, extension nor figure. They are but force centres, for substance can only be conceived of in its ultimate analysis as force. Space, matter and motion are merely phenomena. The greater amount of activity or power of perception the higher and more perfect is the monad. No two monads are alike, they vary by the clearness and intensity of the reflection which they receive of the universe. Yet they are all in harmony and so constituted as to form one universe with God as its efficient cause and the establisher of this harmony, which results in the existence of the best possible world. We have seen that Leibnitz is a spiritualist, and while he would make the monads of the body and the monads of the soul of different orders, he explains their communication with each other by the rule of what he calls Pre-existent Harmony. How do the emotions or volition of the soul operate upon the body? Here he finds a solution in "pre-established harmony," as question-begging a term as the *κίνησις κατά ταρεύκλων* of Epicurus, the occasionalism of Malebranche, or the dualism of Spinoza. "God," he says, "created the soul in such a manner at first, that it should represent within itself all the simultaneous changes in the body; and that he has made the body also in such a manner as that it must of itself do what the soul wills; so that the laws which make the thoughts of the soul follow each other in regular succession, must produce images which shall be coincident with the impressions made by external objects upon our organs of sense; while the laws by which the motions of the body follow each other are likewise so coincident with the thoughts of the soul as to give to our volitions and actions the very same appearance as if the latter were really the natural and the necessary consequences of the former." This is the famous theory of Pre-established Harmony.

Consult: Erdmann, 'Leibnitii Opera Philosophica' (1839); Fischer, 'Leibnitz und seine

Schule'; Duncan, 'English Translation of Leibnitz's Works' (1890); Dewey, 'New Essays of Leibnitz' (1888).

EPIPHANIUS WILSON, M. A.,
Editorial Staff of the 'Encyclopedias Americana.'

Leidy, lī'dī, Joseph, American naturalist: b. Philadelphia 9 Sept. 1823; d. there 30 April 1891. He was graduated M.D. at the University of Pennsylvania in 1844, and in 1853 was elected to the chair of anatomy in that institution, a post which he long filled, as well as that of professor of natural history in Swarthmore College, Pa., to which he was appointed in 1871. He was the author of many valuable memoirs, chiefly published in the 'Proceedings of the Academy of Natural Sciences,' the 'Transactions of the American Philosophical Society,' and the 'Smithsonian Contributions to Knowledge.' Among them may be cited: 'Ancient Fauna of Nebraska' (1853); 'Cretaceous Reptiles of the United States' (1865); 'Fresh Water Rhizopods of North America' (1879).

Leif Ericson. See ERICSON, LEIF.

Leighton, lä'tōn, Frederick, Lord, English painter: b. Scarborough 3 Dec. 1830; d. London 25 Jan. 1896. He received some lessons in art at Paris as early as 1839, and then followed further instruction at Rome. At 14 he entered the Royal Academy of Berlin and subsequent art studies were made by him at Frankfort, Brussels and Paris (1850). From Rome he sent to the Royal Academy exhibition of 1855 his picture of 'Cimabue's Madonna Carried Through Florence'—a work which called forth general admiration, and was purchased by the Queen. He resided mostly in Paris for the next four years, studying and painting, and to this period belong, among other works, 'The Triumph of Music' (based on the story of Orpheus and Eurydice); 'The Fisherman and the Siren,' and 'Romeo and Juliet.' Having finally settled in London, he was elected in 1864 an associate of the Royal Academy, and in 1869 a full academician. In 1878 he succeeded Sir Francis Grant as president of the Royal Academy, was knighted, and was also named an officer of the Legion of Honor. In 1886 he was created a baronet, and on 1 Jan. 1896 was raised to the peerage. From among his numerous works may be singled for special mention: 'Paolo and Francesca' (1861); 'Jezebel and Ahab' (1863); 'Orpheus and Eurydice' (1864); 'Hercules Wrestling with Death' (1871); 'Elijah in the Wilderness' (1879); 'Hero Watching for Leander' (1887); 'Captive Andromache' (1888); 'Greek Girls Playing at Ball' (1889); 'The Bath of Psyche' (1890); 'Lachrymæ,' now in the Metropolitan Museum, New York; as also the two large frescoes at the South Kensington Museum, representing respectively the 'Arts of War' and the 'Arts of Peace.' He achieved a high place as a sculptor by his 'Athlete Strangling a Python' (1876), and his 'Sluggard' (1886). The special merit of his work lies in the perfection of his draftsmanship and design; his coloring, though possessing the unfailing charm of harmonious arrangement, is only thoroughly satisfactory from the decorative point of view. A fine poetic quality conjoined with elegance in drawing and great refinement in execution, mark his whole work. His 'Addresses to the Students of the

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Royal Academy' appeared in 1896. Consult 'Lives' by Mrs. Lang (1885); Rhys (1895).

Leighton, Marie Connor, English novelist: b. Clifton, near Bristol. She was married to Robert Leighton (q.v.) with whom she has written several novels mentioned under his name, and is the author of 'The Harvest of Sin'; 'A Napoleon of the Press' (1900); 'Vengeance is Mine' (1902); 'Was She Worth It?' (1902); etc.

Leighton, Robert, English journalist and novelist: b. Ayr, Scotland, 5 June 1859. He was the son of Robert Leighton, a Scottish poet, was educated at Liverpool, was editor of the Bristol 'Observer' 1886-7, and has for many years been connected with the various periodicals published by Harmsworth. He married Marie Connor in 1889 and with her wrote 'Convict 99'; 'Michael Dred, Detective'; 'In the Shadow of Guilt' and other fictions. He has written by himself 'The Pilots of Pomona' (1892); 'The Thirsty Sword' (1893); 'The Wreck of the Golden Fleece' (1894); 'Olaf the Glorious' (1895); 'The Golden Galleon' (1897); etc.

Leipsic, lip'sik, or **Leipzig**, lip'tsīg, Germany, the largest town of Saxony, and the fourth largest in the German empire, situated in a broad, fertile plain at the confluence of the rivers Elster, Pleisse, and Parthe. The city comprises the inner town, the inner and outer suburbs (Vorstädte), the more outlying suburbs (Vororte), incorporated with the city in 1889-92, all traversed and connected by electric street railroads. The former fortifications surrounding the inner city have been replaced by fine streets and promenades. The old city still retains much of its ancient appearance, but the modern suburbs are characterized by broad streets and imposing buildings. Among the squares of the city are the Marktplatz, with a Siegesdenkmal; the Augustusplatz, one of the largest in Germany, with a splendid fountain; the Königplatz, the Johanniskirche, with a Reformation monument (Luther and Melanchthon); and the Rossplatz; and among the other monuments worthy of mention are those of Gellert and Fechner in the Rosenthal, an extensive park in the northwest, between the Elster and the Pleisse; of Hahnemann, Leibnitz, Grassi, Mendelssohn, and Bismarck; together with the more recent memorial of the Volksschlacht. Besides the parks and open spaces just mentioned, Leipsic includes, among many others, the Johannapark, the Grassipark; the König Albert Park, the scene of the 1897 exhibition; the Johannisthal, with an observatory; the botanical garden; the zoological garden, recently much extended; the palm garden, opened in 1899. The most noteworthy churches of the city are the Thomaskirche (13th century), rebuilt 1885-9; the Nikolaikirche (11th century), recently restored; the University or Paulinerkirche (1240), restored 1896-9; the Matthäikirche, restored 1879; the Johanniskirche (14th century), rebuilt and re-consecrated in 1897, and containing the remains of Sebastian Bach and Gellert; the Peterskirche; the Lutherkirche; the Andreaskirche; two modern Roman Catholic churches; an Anglo-American church; a synagogue; and churches of other denominations. Of non-ecclesiastical buildings the most notable are those of the university, which was

founded in 1409, and now has 220 professors and lecturers, and over 3,200 students. These buildings are mostly modern, especially the Albertinum, erected in 1890-6 in accordance with the plans of A. Rossbach for completing and renewing the whole group. The university library (the Albertina) contains 440,000 volumes and over 4,000 manuscripts. Other buildings and institutions are: the old Rathaus (16th century); the new Rathaus, in course of construction on the site of the Schloss Pleissenburg, a 13th century building, once the citadel of the town, and famous as the scene of Luther's disputation with Eck in 1519; the old exchange (1678), now the meeting-place of the town council; the new exchange in Renaissance style; the Königshaus (17th century), the residence till 1829 of the Saxon princes; the old Gewandhaus, where the celebrated Gewandhaus concerts were long held; the new concert-hall; the imperial bank building, in German Renaissance style; the municipal library (1899), containing 110,000 volumes and many manuscripts; the municipal museum, in Italian Renaissance style; the chief post-office; the new book exchange, the headquarters of the German book trade; the Buchgewerbehaus (1897), with a Gutenberg hall; the panorama building; the Grassi Museum (1896), now including the collections of the former museums of industrial art and ethnology; the police office; the building of the Land and Amtsgericht, enlarged in 1895-6; the building of the Imperial Court, completed in 1895; the new conservatory of music; the old and the new theatre; the Krystallpalast, including concert halls, etc.; the market hall; the large Johannis hospital; a deaf and dumb and a blind institution; the hospital of St. Jakob; the Triesches Institut, for women; three gymnasia, namely, the Thomas-schule (1221), the Nikolaischule (1511), and the royal Gymnasium, a Real Gymnasium; several Realschulen and many other schools; a Handelshochschule, or High Commercial School (1898), the first in Germany; a school of industrial art; a Royal Academy of Arts; and the new infantry barracks at Möckern. Leipsic has railway communication with all the chief towns of Germany, and its situation makes it of great importance as a trading centre. It has three large annual fairs, which have been held ever since the 12th century. It is the headquarters of the book trade in Germany, and takes a foremost place among European towns in the many industries associated with the publication and printing of books. Its other industries include iron-founding, cotton-spinning, wool-combing, the weaving of jute and linen, brewing, sugar-refining, distilling, and the manufacture of machinery, electrical plant, agricultural implements, ethereal oils, dyes, essences, soaps, perfumes, wax-cloth, chocolate, tobacco, paper, leather, tapestry, cement, musical and other instruments, etc. Leipsic is also a world market for furs and all similar goods. The name Leipsic, from the Slavonic *līpa*, a lime-tree, is found applied to a Slavonic fishing village near the present site of Leipsic about 1017. The history of the town during many centuries is one of gradually extending importance. It suffered much during the Thirty Years' war at the hands of both combatants. Its position of pre-eminence in the book trade dates from the latter half of the 17th century. During the earlier years of the 18th century the town became the

LEISLER — LEITMOTIV.

centre of a literary movement under Gottsched. Leipsic and its neighborhood suffered greatly during the Napoleonic wars, and on 16-19 Oct. 1813 a series of severe battles fought around the town resulted in a crushing defeat of Napoleon, and the retreat of the French from Germany. During the war of 1866 Leipsic was occupied by Prussian troops for 18 months. In 1879 the Supreme Court of Justice for the empire was established in the city. Pop. (1900) 455,089.

Leisler, lis'ler, Jacob, American colonial political leader: b. Frankfort-on-the-Main, Germany; d. New York 16 May 1691. He came to America as a private soldier in the service of the Dutch West India Company, and was for a time engaged in trade at Albany, and later settling in New York was appointed in 1783 one of the "commissioners" (judges) of the court of the admiralty. In 1689 he was the leader of the insurrection against Governor Nicholson, supported mostly by the militia and the lower classes; the fort and the public funds were seized on the 31st of May, and Leisler a few days later declared for William and Mary, asserting his acts to be necessary for the "preservation of the Protestant religion." A committee of safety was formed, who on 8 June commissioned Leisler as "captain of the fort." In this capacity he at once began to repair the fort, and strengthened it with a "battery" of six guns beyond its walls, which was the origin of the public park still known as the Battery. Nicholson and the council of the province, with the authorities of the city, attempted by pacific means to prevent the uprising, but without effect. Becoming finally alarmed for their own safety, the lieutenant-governor sailed for England, and the mayor with the other officials retired to Albany. On 16 August the committee of safety appointed Leisler "commander-in-chief of the province," with the full power of a governor in all matters civil and military. He next attempted to reduce Albany and the northern parts of the colony, which from the first had refused to recognize his authority, but was for some time unsuccessful; Albany finally submitted to him after the Indian attack on Schenectady (1690). In December arrived a despatch from William and Mary directed "to Francis Nicholson, Esq., or in his absence to such as for the time being takes care for preserving the peace and administering the laws in his majesty's province of New York." This Leisler construed as an appointment of himself as the king's lieutenant-governor. He therefore dissolved the committee of safety, swore in a council, and assumed the style of a royal lieutenant-governor and commander-in-chief. After the massacre at Schenectady he engaged with great vigor in the expeditions against the French, and equipped and despatched against Quebec the first fleet of men-of-war ever sent from the port of New York. A few months later Major Ingoldsby arrived with the news of Sloughter's appointment as governor, and demanded possession of the fort, which Leisler refused. On Sloughter's own demand immediately upon his arrival in March 1691, he likewise refused to surrender it, until convinced of Sloughter's identity, and the latter had sworn in his council. Leisler was immediately imprisoned, charged with treason and murder, and shortly after tried and condemned

to death. His son-in-law and secretary Milborne was also condemned on the same charges. These trials were manifestly unjust; the judges were the personal and political enemies of the prisoners, and Sloughter for some time hesitated to sign the death warrants. Leisler's son secured from the English Parliament the reversal of the bill of attainder in 1695; and the confiscated estates were also returned to the heirs. Consult: Brodhead, 'History of New York'; 'Documentary History of New York', and E. S. Brooks, 'In Leisler's Times' (a historical story).

Leith-Adams, Mrs. See LAFFAN, BERTHA JANE.

Leith, lēth, Scotland, a seaport and parliamentary burgh in the county of Midlothian, and a northeastern suburb of Edinburgh, on the south shore of the Firth of Forth, on both sides of the Water of Leith. It is connected with Edinburgh by Leith Walk and other lines of streets, and by branch lines of the railways centering in Edinburgh. Among the principal public buildings are the custom-house, exchange buildings, court-house, Trinity House, corn-exchange, the new and well equipped Leith Academy, including the Leith Technical College, and there are fine parks and public golf links. The chief manufactures are ropes, sail-cloth, oil-cake, paints, colors, artificial manures, and there are shipbuilding-yards, iron-foundries, engineering works, flour-mills, oil-mills and refineries, steam saw-mills, large maltings, an ice factory, etc. The foreign trade is chiefly with the Baltic and the principal French and German ports, and there is a trade in grain, flour, etc., with the United States and Canada. There are extensive wet-docks, and several public graving-docks, capable of receiving the largest vessels. Leith is a very ancient town, its earliest charter dating from 1128. Pop. (1901) 77,439.

Leitha, li'tā, Austria-Hungary, a river rising in Lower Austria, and flowing northeast for the greater part of its course of 90 miles along the frontier of Austria and Hungary, until it joins the Danube at Altenburg. The Leitha Mountains rise between it and Lake Neusiedl, and it has a factitious importance in its application to Hungary as Trans-leithan and Austria as Cis-leithan.

Leitmotiv, lit'mō-tēf, in music, the leading theme, the characteristic phrase, which occurs over and over again in the same composition, in reference to the same person, phrase of feeling or scenic complication of intense passion or action. The phrase strikes the note of these several crises or conjunctures and recurs whenever they are repeated. While many operatic composers, such as Mozart and Weber, have employed the expedient of the leading theme, Wagner does so more than any other modern musician. In his *Leitfäden*, or analyses of his operas, in which he lays bare some of the secrets of his artistic workmanship, he shows that he has consciously individualized every one of his characters, every change in the scenery or action of the drama, or in the emotions and moods of the *dramatis personæ*, by the introduction of a specific musical theme, which he employs throughout the opera to suggest the same thing. This theme is worked upon and varied with the masterly skill which Wagner possesses in fugue and part writing. Thus in

LEIXNER-GRÜNBERG—LELAND STANFORD JR. UNIVERSITY

his 'Parsifal,' Klingsor, Kundry, Parsifal, Amfortas, and the Flower maidens are all ushered in with a special leading theme for each. There is a special theme for the Eucharist, for the spear (*Speermotiv*), for the Holy Grail (*Gralmotiv*). The children's voices raise a strain 'Faith is still alive' to the notes of the *Glaubensthema*, or faith-motive. There is a *Leidensmotiv*, to express the grief of Amfortas; there is the Doormotiv, expressing the promise of help; the Zaubermotiv, suggesting the devilish power of witchcraft, while the mother's sorrow is suggested by the Motiv des Herzleids, the heart-grief's theme. The Bell-theme, with its pealing sound, the Ride-theme, suggesting the clatter of horsehoofs, the Good Friday theme, with its characteristic chords, each in its way, are powerfully suggestive, and when once recognized, their recurrence has a powerful effect.

Leixner-Grünberg, līks'nér grün'bērg, Otto von, German poet and critic: b. Saar in Moravia 24 April 1847. Among his poetical works are: a volume of 'Poems' (1868); the drama 'Resurrection of Germany' (1870); 'Twilight' (1886); 'Proverbs and Satiric Rhymes.' He has also written short stories: 'The Two Marys'; 'Memento Vivere'; 'Princess Sunshine' (1882). Still other works are: 'Marginal Notes by a Hermit'; 'Gossamer' (1886); 'Gossip Letters to a Young Matron' (1890); 'Lay Sermons' (1894). His 'History of German Literature' (1879-82) is a notable work.

Le'land, Charles Godfrey, American author: b. Philadelphia 15 Aug. 1824; d. Florence, Italy, 20 March 1903. He showed poetic talent in youthful contributions to newspapers, and a growing genius, marked by unusual versatility, during his college days at Princeton, where he was graduated in 1846. He studied afterward at Heidelberg, Munich, and Paris, giving special attention to modern languages, philosophy, and æsthetics. In 1848 he took part in the revolutionary uprising in Paris; the same year returned to Philadelphia and studied law; was admitted to the bar in 1851, but gave up the legal profession and devoted himself to literary pursuits, becoming prominent in various fields of journalism and authorship. For a time he was editor of the New York 'Illustrated News'; in 1861 established the 'Continental Magazine' in Boston, and two years later returned to Philadelphia, where for several years he edited the *Press*. During the Civil War he published 'The Book of Copperheads,' a political satire. From 1869 to 1880 he resided chiefly in London. In England and on the Continent he studied gypsies and gypsy lore, in which he became one of the leading authorities of his time. His career as poet, ethnologist, and traveler, with its mingling of literary avocations, was invested with an element of romance, and his more serious work was lightened by the interchange of humor. At the same time his achievements show the practical talents of a man of business. When in 1880 he once more returned to Philadelphia he was instrumental in establishing industrial teaching in the public schools, in furtherance of which he wrote a number of manuals and gave his supervision to the work. From 1886 he lived in Europe, mainly in Florence. He wrote and translated a large number of works, remarkable for variety

as well as for literary value, the best known and most popular of which are 'Hans Breitmann's Ballads' (1867-70, 1895), written in 'Pennsylvania Dutch,' his translations from Heine, including 'Pictures of Travel' (1856), and 'Heine's Book of Songs' (1862), 'English Gypsies and Their Language' (1873), 'English Gypsy Songs' (in collaboration, 1875), 'The Gypsies' (1882), and 'Gypsy Sorcery and Fortune-Telling' (1892). Among his other writings are: 'The Poetry and Mystery of Dreams' (1855); 'Meister Karl's Sketch-Book' (1855); 'Sunshine in Thought' (1862); 'Legends of Birds' (1864); 'The Music-Lesson of Confucius' (1870); 'The Egyptian Sketch-Book' (1873); 'Fu-Sang; or the Discovery of America by Chinese Buddhist Priests in the Fifth Century' (1875); 'Johnnykin and the Goblins' (1876); 'Pidgin-English Singsong' (1876); 'Abraham Lincoln' (1879); 'The Minor Arts' (1880); 'Algonquin Legends of New England' (1884); 'Etruscan-Roman Remains in Popular Tradition' (1892); 'Autobiographical Memoirs' (1893); 'Songs of the Sea and Lays of the Land' (1895); 'Mending and Repairing' (1896); 'One Hundred Profitable Acts' (1897); 'The Unpublished Legends of Virgil' (1899); and (his last work) 'Kuloskap the Master, and Other Algonkin Poems' (1903), a volume of Indian folklore in verse, written in collaboration with John Dinley Prince.

Leland, lēl'and, or **Leyland**, John, English antiquary: b. London about 1506; d. there 18 April 1552. He was educated at Cambridge, Oxford, and Paris. Returning home he took holy orders, and Henry VIII. made him his chaplain and librarian. In 1530 he became rector of Pepeling, near Calais; in 1542 he received the rectory of Haseley, Oxfordshire, and he was a prebend of Salisbury Cathedral. In 1533 he received the title of royal antiquary, and was empowered, by a commission under the great seal, to search for objects of antiquity in the archives and libraries of all cathedrals, abbeys, priories, etc., in consequence of which he spent six years in traveling and collecting materials for the illustration of the history and archaeology of England and Wales, but died without having completed his undertaking. The great bulk of his collections was placed in the Bodleian Library. The first part to be published was the 'Commentarii de Scriptoribus Britannicis,' issued in 1709 by Anthony Hall. In 1710 Hearne published the 'Itinerary' in 9 vols., and five years later the 'Collectanea' was issued by him in 6 vols. Leland wrote Latin poetry with considerable elegance, and a collection of his miscellaneous Latin verse and epigrams was published in 1589.

Leland Stanford Junior University, a co-educational institution at Palo Alto, California, about 35 miles southeast of San Francisco, in the Santa Clara Valley. The University Campus comprises 9,000 acres of land, partly in the level of the valley and partly rising into the foothills of the Santa Moreno Mountains which separate it from the Pacific Ocean, 33 miles beyond. The Bay of San Francisco lies in front at a distance of three miles and across it are the mountains of the Diabolo range.

The University was founded by Leland Stanford (q.v.) and his wife, Jane Lathrop Stanford (q.v.), as a memorial to their only son who died

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in his 16th year. The founders desired that the University should give a training primarily fitted to the needs of young men. Both sexes are admitted to equal advantages in the institution, but the number of young women who may attend at any given time is limited to 500. The object of the University as stated by its founders is "to qualify students for personal success and direct usefulness in life," and to "promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty and the pursuit of happiness."

The endowment grant establishing the University was made in November 1885, under an act of legislature passed for this purpose; the cornerstone of the institution was laid in May 1887; and the University was formally opened to students on 1 Oct. 1891. The attendance for the first year numbered 559 and included all college classes with a number of graduate students, the University graduating its first class of 38 in May 1892. The original faculty numbered 35 professors and instructors and the first, and to the present time (1903) the only, president has been David Starr Jordan (q.v.).

The architecture of the University buildings is patterned after the old Spanish missions of California and Mexico. The buildings are of buff sandstone with red tile roofs. They form two quadrangles, one within another, with detached buildings grouped about them. The inner quadrangle consists of 12 one-story buildings, connected by an open arcade, facing a paved court of three and one quarter acres in extent. Connected with this quadrangle at various points by corridors, and completely surrounding it, is the outer quadrangle of 12 buildings, for the most part two stories in height above the basement. This outer quadrangle is again surrounded by a continuous open arcade. In the inner quadrangle are the departments of law, of the different languages, and mathematics, and the administrative offices. In the outer quadrangle are the scientific, engineering and geological departments, those of history, economics and English, and the library and assembly hall. In the rear of the quadrangles are the central lighting, heating and power plant and the laboratories and shops of the engineering departments. The dormitories, one for young men and another for young women, with their gymnasiums and athletic grounds about them, are located to the east and west. In front on either side of the main drive are the buildings for the department of chemistry and the art museum and the new gymnasium, the latter in course of erection. The final building to complete the general scheme of buildings, which is to be the permanent home of the University library, will soon be begun.

Most striking among the architectural features of the University buildings are the Memorial Arch and the Memorial Church. The former is 100 feet in height, 90 feet in width and 34 feet deep, with an archway of 44 feet spanning the main entrance. A sculptured frieze 12 feet in height, designed by St. Gaudens, and representing the progress of civilization, surrounds the arch. The Memorial Church opens from the inner court and is opposite the

main entrance. It is of Moorish-Romanesque architecture, its spire rising to a height of 188 feet. The church, erected by Mrs. Stanford in memory of her husband, is adorned within and without with costly mosaics, representing as do the beautiful stained windows, Biblical scenes and characters. It has a splendid organ of 46 stops and 3,000 pipes and a chime of sweet-toned bells. The church is non-sectarian in character and method. Religious services are held each Sunday morning and afternoon. There is a week-day vesper service and the organ is played each day at the close of recitations.

The students live in the dormitories, in club houses on the grounds, or in private boarding-houses in the village, which is situated a mile distant from the University buildings. The professors live in homes provided on the grounds or in the village. Twelve Greek-letter societies for young men and five for young women occupy chapter homes on the campus.

In the government of the students, "the largest liberty consistent with good work and good order is allowed. They are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Students failing in these respects or unable or unwilling to do serious work toward some definite aim are not welcomed and are quickly dismissed."

The University Council consists of the president, professors, and associate professors of the University faculty. To it is entrusted the determination of requirements for admission, graduation, and other matters relating to the educational policies of the institution. It acts as an advisory body on questions submitted to it by the president or trustees. The routine work of the faculty is divided among various standing committees with power to act and responsible primarily to the president. Departmental affairs are in the hands of subordinate councils consisting of the instructing body in the department, a member of which is designated by the president as presiding officer.

The general control of the University's affairs was by special provision in its charter reserved to the founders or either of them during their lifetime, they to act in the capacity of a board of trustees, the trustees themselves having only a nominal connection. This provision remained in force until July 1903, when under a special act of legislature passed for the purpose, Mrs. Stanford finally turned over to the board of trustees full authority and control over the University. The board of trustees numbers 15, members being elected for a term of 10 years. In educational matters the president of the University has the initiative, his acts being subject to the confirmation of the trustees. The board through a treasurer and business manager, one of their own number, administers directly the financial affairs of the institution.

The endowment of the University comprises 90,000 acres of land, including the Palo Alto estate; the Stanford home in the city of San Francisco, and interest-bearing securities, the whole amounting to about \$30,000,000, two-thirds of which is productive of income. For the present the income of the University is devoted largely to the completion of its buildings.

In its entrance requirements the University



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recognizes 29 entrance subjects of different values according to the time devoted to them in the secondary schools. The unit of value is a full year of high school work in the particular subject, and any 15 units, with certain limitations, chosen from this list constitutes preparation for full entrance standing. The University has no list of accredited schools, but considers on its merits the work of all reputable schools. The student chooses a major subject, the professor in which becomes his adviser and to which he is required to devote one fourth of his time. His remaining time is filled up by courses chosen by the student under the advice and direction of his major professor. Fifteen hours of recitations per week constitutes the regular course throughout a period of four years. Students are graduated when they have completed 120 hours of work and the requirements of their major subject. Degrees are conferred in May, September, and January.

The University grants the undergraduate degree of A. B. in all courses; the degrees of A. M. and Ph. D. for one, and three years' work respectively beyond the undergraduate requirements; the LL. B. degree in law, and that of Engineer for graduate work. The University grants no honorary degrees.

The work of the University is grouped under the following departmental heads:

Greek, Latin, Germanic Languages, Romanic Languages, English Language and Literature, Philosophy, Psychology, Education, History, Economics and Social Science, Law, Drawing, Mathematics, Physics, Chemistry, Botany, Physiology and Hygiene, Zoology, Geology and Mining, Civil Engineering, Mechanical Engineering, Electrical Engineering.

The University Library contains 75,000 volumes. The attendance for the year 1902-3 was 1,483, of which 998 were men, 485 women. The faculty numbers 130. Tuition is free to California students. Those from other States pay a registration fee of \$10 per semester.

GEORGE A. CLARK,
Secretary of the University.

Leland University, a Baptist institution for the education of the colored people; founded in 1869, in New Orleans, La., by Holbrook Chamberlain of Brooklyn, N. Y. It has large grounds, commodious and well equipped buildings, and a fair endowment. It is a school and a system of schools, with a faculty of over 60 members and co-ordinated courses of study. It is made up of a number of academies, each built and maintained by one of the 15 Baptist Associations in the State. The courses consist of the usual work of the elementary and secondary schools, including a preparatory department where pupils are fitted for college. In addition are a college, a theological department, training classes for pastors and teachers, and departments of manual training, domestic science, and agriculture. Dr. R. W. Perkins is president (1903), and the board of trustees is made up of prominent citizens of New Orleans, La., and Brooklyn, N. Y. The number of students in 1903 was over 2,000.

E. R. W. PERKINS,
Leland University.

Le Loutre, Louis Joseph, 100-é zhō-zéf lē lootr, French missionary: b. about 1692; d. about 1775. He was vicar-general of Acadia,

and from about 1740, when he was sent to Nova Scotia, he labored for years among the Micmac Indians of that region with great success, obtaining practical control of all their affairs, spiritual and otherwise. He led them against the English, and when the country fell into the hands of Great Britain succeeded in compelling the Acadians to show their allegiance to King Louis, although for years they had been subjects of King George. The consequence was terrible suffering for the simple people, whose miseries became historic through their deportation in 1775. Le Loutre fled to Quebec, sailed for France, was taken by the English and kept prisoner in the Isle of Jersey for eight years. Being released, he returned to France, where he died.

Lely, lē'lī, SIR Peter, Dutch painter: b. Soest, Westphalia, 1618; d. London 30 Nov. 1680. His real name was Pieter van der Faes, but he assumed as his artistic title a nickname, Lely, or rather Le lys, which had been borne by his father. He was the pupil of Peter Grebber in his early manhood, but went to England in his 23d year and began his career as a portrait painter. His pictures were much admired and Charles I. appointed him court painter. He painted the portrait of that sovereign and also of Cromwell, but he reached his greatest eminence after the Restoration. He was an imitator of Van Dyck, whom he almost equaled in the excellence of some of his earlier work. But as he fell in with the artificiality of Charles II.'s licentious court his manner lost much of its dignity and originality, and with a fatal facility he assumed that mannerism which detracts so much from the artistic worth of his portraits. His coloring as well as his drawing became weak and conventional. He was, however, a great favorite with the king and his famous "Beauties of Hampton Court" was painted at the request of his royal master, these "beauties" being the loveliest women of the court, including the Duchess of Cleveland. Lely founded the school of English portrait, and up to the time of Reynolds and Lawrence was its ablest representative. His method of handling, as well as his conception of the portrait, were long imitated, and even to-day have their influence.

Lemaître, Jules, zhül lē-mātr, French critic: b. Vennecy, Loiret, 27 April 1853. He was a teacher in various schools, and a professor at Grenoble in 1883-4. He then resigned his post and entered on a successful literary career at Paris. Though he wrote two books of verse and three of short stories, he won his position in French letters by his criticism, his essays having associated him with Brunetière as a representative figure. "Impressions du Théâtre" (1888 et seq.), and "Contemporains" (1886 et seq.) collect the best of his articles. His dramas, such as "Député Leveau" (1891), "Les Rois" (1893), and "Le Pardon" (1895), have also been much approved.

Léman, lā-mān, Lake, a name sometimes given to the Lake of Geneva. See GENEVA, LAKE OF.

Lemars, lē-märz', Iowa, city, county-seat of Plymouth County; on the Chicago, St. P., M. & O., and the Illinois C. R.R.'s; about 155 miles northwest of Des Moines, the capital of the State, and 24 miles north by east of Sioux

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City. It is situated in an agricultural region in which cattle, wheat and corn are raised extensively. The chief manufactures are foundry and machine-shop products, flour, brick, blank books, and dairy products. It has a public library. Lemars is the seat of the Western Union College, under the auspices of the United Evangelicals. Pop. (1900) 4,146.

Lemberg, lém'bérg, Austria, the capital of the crownland of Galicia, on the Peltew, 365 miles by rail northeast of Vienna. Founded in the 13th century and formerly surrounded by walls, the city notwithstanding has a modern appearance, the walls having been replaced by boulevards and promenades. It is the seat of the crownland government, and of the important courts and public offices connected with it, also of three metropolitan sees, Greek, Armenian, and Roman Catholic, with their cathedrals and establishments. The university founded in 1784 and reorganized in 1817 is attended by about 2,000 students, and has a library of over 86,000 volumes. The National Institute founded in 1817 by Ossolinsk has a library of over 80,000 volumes and 3,000 MSS. chiefly of Polish literature. The manufactures are extensive and varied, and there is a large trade, mostly in the hands of Jews. The heterogeneous population consisting of Jews (over 31,000), Poles, Ruthenians, and Germans, was (1900) 159,618.

Lémery, lám-ré, Nicolas, French chemist: b. Rouen 17 Nov. 1645; d. Paris 19 June 1715. At an early age he displayed a taste for chemistry, went to Paris in 1666, and attached himself to Glaser. He soon left Glaser and took up his abode at Montpellier, where he had the free use of a laboratory, and began to give lectures which excited great interest and were attended by many of the influential inhabitants of the place. In 1672 he returned to Paris and gave courses of lectures on various parts of chemistry, the success of which seems to have been very great. His 'Cours de Chimie' appeared in 1675. This book went through numerous editions—31, it has been calculated—and was translated into the chief European languages. The book is plainly modeled upon the prior treatises of Lefebvre and Glaser, the opening chapters being identical in manner and treatment, but shows proof of the author having profited by the work of his predecessors. In 1681 the religious troubles began to harass him; he was required to demit his office by a given time, and had ultimately, in 1683, to take shelter in England, where he was well received by Charles II., to whom he dedicated an edition of his book. He returned later to France, graduated as doctor of medicine at Caen, went to Paris, where he soon had a very large practice; but in 1685 the revocation of the Edict of Nantes forbade him, as a Protestant, the exercise of this profession. Against this he struggled for a little, but in 1686 joined the Roman Catholic Church. In 1699 he became an associate of the Academy of Sciences. Besides the 'Course of Chemistry,' Lémery wrote and published other works and papers, among which may be mentioned: 'Pharmacopée universelle' (1697); 'Traité universelle des Drogues simples' (1698); 'Traité l'Antimoine' (1707). It deserves to be remembered that he was one of the first to attempt the elucidation of natural terrestrial phenomena by referring them to chemical action, and to ex-

hibit these on an experimental scale, as when he made what is still known as Lémery's volcano, by placing a mixture of sulphur and iron in a hollow, heaping up the earth over the mixture, moistening, and leaving it to itself. By-and-by combination between the iron and sulphur begins, heat is evolved, the earth heaves and swells, steam escapes, and the resemblance of the miniature eruption to the larger original is very striking. He left two sons, both of whom were afterward distinguished as chemists.

Lem'ly, Henry Rowan, American soldier: b. North Carolina 12 Jan. 1851. He was graduated from West Point in 1872, and was appointed 2d lieutenant of the 3d cavalry. In March 1898 he was promoted captain, and during the Spanish-American War commanded Battery C of the 7th United States Artillery in the Porto Rico campaign. He was retired at his own request 20 April 1899. He has published 'What Was El Dorado?'; 'Among the Arapahoes'; 'West Point Romance'; 'Padre Anselmo'; 'A Queen's Thoughts'; etc.

Lemly, Samuel Conrad, American naval officer: b. Salem, N. C., 14 March 1853. He was graduated at the United States Naval Academy in 1873; was promoted lieutenant in January 1886; and in 1892 was appointed judge advocate-general of the navy. He was reappointed in 1896 and 1900, and in 1901 was the legal representative of the navy in the Schley Court of Inquiry.

Lem'ming, a short-tailed rat-like animal, related to the European voles and American meadow-mice, which inhabits the high mountains of Scandinavia. Its technical name is *Myodes lemmus*, and closely related species are found in northern Siberia and in Arctic America. In general appearance these animals are more like miniature short-eared, yellowish rabbits or pikas than like mice; they subsist wholly upon vegetable food, dwell in nests made of bark, grass, etc., in some sheltered nook, and do not hibernate but force their way about underneath the snow in search of moss, lichens, sprouting woody plants and other edible things. They are very prolific, rearing two broods of four to six young annually, and hence every few years they become so numerous that the mountains can no longer support the hordes. At such times, occurring at irregular intervals of several years according to circumstances, an exodus takes place, and great numbers of lemmings descend from the mountains and spread over the lowlands. There the easier climate, more abundant food and absence of enemies, permit a still further multiplication, so that by the following season the little animals have increased into a plague. They wander more and more widely, overrun and damage, or sometimes wholly devour crops, gardens and meadows, and make themselves a destructive nuisance. Such an invasion is felt more severely in the narrow and fertile valleys of Norway than in the broader and more forested spaces of Sweden. At such a time concerted measures are devised to kill them off, carnivorous mammals and birds flock to the feast, and epidemic diseases often break out among them. Spreading with a restless energy for travel, the lemmings overcome or attempt to overcome all obstacles, and heedlessly plunge into lakes too large or rivers too swift to be crossed. When

LEMMING-MICE — LEMON OIL

the remnants of the host reach the sea many of them boldly swim out in their ignorance of its magnitude and are drowned. Such overrunning of the country by lemmings is not known in Arctic Asia or America, where different conditions exist.

Lemming-mice, certain small mice-like animals closely related to the lemmings and having similar traits, inhabit the region about Hudson Bay and the southern part of Greenland, of which the most prominent is *Cuniculus torquatus*, chiefly remarkable for its turning white in winter. Other species belong to the genera *Synaptomys*, *Lemmus*, etc.

Lem'mon, John Gill, American botanist: b. Lima, Mich., 2 Jan. 1832. He studied at the University of Michigan, but left to enter the Federal army in June 1862, and was a prisoner at Andersonville, Ga., from August 1864, till the end of the Civil War. He has lived in California from 1866, where he was for four years botanist of the State Board of Forestry. He has published 'Recollections of Rebel Prisons' (1874); 'Ferns of the Pacific Slope' (1884); 'Handbook of North American Cone Bearers' (1895); 'Botanizing in Apache Land' (1901); 'How to Tell the Trees' (1902); etc.

Lem'nian Earth, a reddish earth found in the island of Lemnos, celebrated as a remedy for snake-bites and various diseases, and collected by the ancients in accordance with special religious observances on only one day in the year. Analysis shows it to be composed of silica, 67 per cent; alumina, 14 per cent; water, 8 per cent; iron oxide, 5 or 6 per cent; soda, about 3 per cent, and traces of lime and magnesia. Its classical name "terra sigillata" (sealed earth) is due to the fact that it was compressed and marked with the head of the Lemnian Diana. The earth is a fair substitute for soap, but has no medicinal properties.

Lem'nos, the classical name for STALIMENE, the northernmost island of the Grecian archipelago, between the Hellespont and Mount Athos. It anciently contained a volcano, Mosychlus, which was regarded as the workshop of Hephaestos (Vulcan), and was worshipped by the Greeks as sacred. The island belongs to Turkey and consists of two peninsulas almost separated by the harbors of Paradiso and San Antonio. It has an area of 160 square miles, and abounds in vineyards, wheatfields, olive and fruit groves. The chief town is Limno or Kastro, with 3,000 inhabitants, a fortified place on the west coast. Pop., chiefly Greeks (1903) 27,000.

Le Moine, lē-moin', Sir James MacPherson, Canadian historian: b. Quebec 24 Jan. 1825. He was educated in his native city and in 1850 was called to the bar. In 1869 he was appointed inspector of the inland revenue district of Quebec. He was knighted in 1897. Among his works are: 'L'Ornithologie du Canada' (1860); 'Étude sur les Navigateurs Arctiques Franklin, McClure, Kane, McClintock' (1862); 'The Tourist's Note-Book' (1870); 'Quebec: Past and Present' (1876); 'The Scot in New France' (1880); 'Picturesque Quebec' (1882); 'The Land We Live In' (1891).

Lemon, Mark, English humorist and playwright: b. London 30 Nov. 1809; d. Crawley, Sussex, 23 May 1870. He made his first es-

says in the lighter drama, and the modern London stage was supplied by his facile pen with more than 60 pieces, farces, melodramas, and comedies, among which were: 'The School for Tigers,' 'The Serious Family,' and 'The Ladies' Club.' On the establishment of 'Punch' in 1841 he became joint editor with Henry Mayhew, and two years later, sole editor, controlling that periodical for 29 years. He was also literary editor of, and frequent contributor to, the 'Illustrated London News.' Among his later productions are several novels: 'Loved at Last,' 'Golden Fetters,' etc. He also edit'd 'Mark Lemon's Jest Book.'

Lemon, a small tree or spreading shrub (*Citrus medica* var. *limon*) of the natural order *Rutaceæ*. It is a native of India, but has been introduced into tropical and subtropical countries throughout the world, especially those of the Mediterranean region, whence it was imported into Florida and California. In Florida the cold wave of 1894-5 destroyed most of the orchards, leaving only those in the southernmost counties, the soil of which is poorly adapted to the trees and must be carefully mulched, fertilized and managed to yield profitable returns. In California the lemon was introduced about 1850, but did not become commercially important until the closing quarter of the 19th century, during the last ten years of which the annual shipments to eastern markets averaged about 1,200 carloads, although half of the 400,000 trees had not yet reached bearing age. The climate is perfect, but the water supply is deficient, so that the orchards must be irrigated. The fruit is one of the most important grown in the United States, since in addition to its value in food drink, the citric acid of its juice is used upon a commercial scale by calico-printers, who by its aid remove iron from patterns stamped with certain dyes; and the oil or extract distilled from the rind is serviceable in perfumery, for flavoring, etc.

Owing to its spreading habit the tree must be carefully pruned, else it will make the necessary cultivation impossible and will result in bearing fruit at or near the ends of long willowy branches. The trees are usually set about 20 feet apart each way, given clean cultivation and fertilization like the orange (q.v.). The fruit, which ripens during the winter is cut, not pulled, green as soon as it is two and one quarter inches in diameter, the picker carrying a gauge. These details have been found necessary since lemons ripened on the tree are of inferior quality and will not keep well, and since the market demands lemons in the summer. The fruit is spread in shallow trays and stored in a well ventilated curing house where by careful management it develops the characteristic yellow skin, which also becomes tougher, thinner, more pliable and silky and less liable to injury in handling. When properly managed, lemons are profitable, and because of the constant demand are more reliable than any other of the citrus fruits.

Lemon Oil, a volatile oil obtained, by pressure, from lemon peel. It consists chiefly of a terpene, $C_{10}H_{16}$, known as limonene, which boils at 349° F., and closely resembles citrene, though differing from it in certain essential particulars. Lemon oil has an agreeable odor, and is used chiefly as a flavor and perfume. It is reputed to change spontaneously into turpentine

LEMON VINE—LE MOYNE

upon keeping, but this belief probably has no foundation in fact. Lemon oil mixes in all proportions with glacial acetic acid and with absolute alcohol.

Lemon Vine. See BARBADOS GOOSEBERRY.

Le Moine, Antoine, än-twän le-mwän, SIEUR DE CHÂTEAUGUAY, French soldier and colonist in America: b. Montreal 7 July 1683; d. Rochefort, France, 21 March 1747. He was a son of Charles Le Moine (1626-85) (q.v.). He entered the French army, and in 1704 came to Louisiana with a company of settlers. In 1705-6 he fought under D'Iberville against the English, in 1717 was appointed commandant of the French forces in Louisiana, and in 1718 king's lieutenant of that colony. With the aid of Indians he captured Pensacola from the Spanish 14 May 1719; but he surrendered it 7 August. Having been held as a prisoner of war until July 1720, he took command at Mobile upon the conclusion of the peace of that year, but returned to France in 1726. He was governor of Martinique in 1727-44, and from 1745 of Cape Breton.

Le Moine, Charles, shärl, SIEUR DE LONGUEUIL, French settler, soldier, and proprietor in America: b. Dieppe, France, 1626; d. Villemarie, Canada, 1685. He came to Canada in 1641, settled at Villemarie, and was interpreter between the Hurons and the colonists. In 1651 he successfully defended the fort from an attack by the Iroquois, whom he routed with great slaughter; and in 1653 he concluded a peace with the Five Nations. These Indians, however, in 1655 again made an attack upon the colony, which was saved from destruction largely by Le Moine's exertions. In 1657 Le Moine received from François de Lauzon, who held 60 leagues of land under royal grant, full seigniorial rights; and in 1664 his possessions were largely increased by the cession of Isle St. Hélène and other tracts. He participated in the expedition led by Tracy and Courcelles in 1666-7, and in several campaigns against the Iroquois; and for many years was captain of Montreal. He was made Sieur de Longueuil in 1668, and to this title that of Châteauguay was later added.

Le Moine, Charles, 1ST BARON DE LONGUEUIL, French soldier in America: b. Villemarie, Canada, 10 Dec. 1656; d. there 8 June 1729. He was a son of Charles Le Moine (1626-85) (q.v.). He entered the French army, with which he served in Flanders, but returned in 1683 to Canada, where he became mayor of Montreal. He promoted colonization in Canada, and built a stone fort on his estates at Longueuil. In the campaign of 1687 against the Iroquois he was commander of a division of militia; and in 1690 he was wounded at the repulse of Phipps' attack on Quebec. He was made baron and governor of Montreal in 1700 for services to the colony; commanded the Canadian forces at Chambly, when the English made an unsuccessful attempt to take Montreal; and in 1711 became commander-in-chief of the colonial troops. He commanded at Three Rivers in 1720, and was again governor of Montreal in 1724-6. In 1726 he rebuilt Fort Niagara.

Le Moine, Jacques, zhäk, SIEUR DE SAINTE HÉLÈNE, French soldier in America: b. Villemarie, Canada, 16 April 1659; d. Quebec October 1690. He was a son of Charles Le Moine (1626-85) (q.v.). In March 1686 he accom-

panied the expedition led by the Chevalier de Troyes against the English on Hudson Bay, and in the capture of Forts Rupert, Monsipi, and Quitchitchonéen, and the seizure of the English governor-general, took a prominent part. He was second in command of the expedition that captured, plundered and burned Fort Corlear (now Schenectady) 9 Feb. 1690. In October Phipps laid siege to Quebec, and Le Moine was selected to direct the defense. He was mortally wounded while leading about 200 troops in the repulse of 1,300 British at the passage of the St. Charles.

Le Moine, Jean Baptiste, zhöñ báp-tëst, SIEUR DE BIENVILLE, French administrator in America: b. Villemarie, Canada, 23 Feb. 1680; d. Paris 1768. He was a son of Charles Le Moine (1626-85) (q.v.). In 1691, upon the death of his brother, Charles, Baron de Longueuil (q.v.), he succeeded to the title; but he was known as De Bienville. In 1697 he served in the expedition of the Chevalier de Troyes against the English settlers in Hudson Bay. He afterward went with his brother, D'Iberville (see IBERVILLE) to France, and 24 Oct. 1698, sailed from Brest in the expedition led by D'Iberville to take possession of the mouth of the Mississippi. Bienville was appointed lieutenant of the king, explored the surrounding region, and in 1700 became commander of a fort on the river 44 miles above its mouth. He succeeded Sauvole in the direction of the colony, and assumed command of the camp of Biloxi 22 Aug. 1701. In December he transferred the settlement to Mobile, which prospered through the arrival of recruits from France with supplies (1703-4) and of 50 Canadians (1706). In February 1708 he was ordered to France as a prisoner, but he was later reinstated. The attempt to cultivate the soil by Indian labor having been unsuccessful, he suggested to the king in 1708 the importation of negroes from the Antilles, to be exchanged for Indians at the rate of three Indians for two negroes. In 1713 Cadillac arrived as governor, and Bienville was commissioned lieutenant-governor. Bienville led an expedition to the territory of the Natchez Indians in 1716, built a fort, and concluded a treaty. In 1718 he became governor of Louisiana, in the same year founded New Orleans, which was made the seat of government in 1723, in 1724 went to France to answer charges preferred against him, but in 1733 returned as governor with lieutenant-colonel's rank. After unsuccessful campaigns against the Chickasaws in 1736, 1739, and 1740, he sailed for France in 1743.

Le Moine, Joseph, zhözëf, SIEUR DE SÉRIGNY, French soldier in America: b. Villemarie, Canada, 22 July 1668; d. Rochefort, France, 1734. He was a son of Charles Le Moine (1626-85) (q.v.). He entered the French navy, and in 1694 and 1697 commanded the flotilla which co-operated with his brother, D'Iberville (see IBERVILLE) in the expedition to seize Hudson Bay. Later he received command of a squadron, took to Louisiana Canadian settlers, and surveyed (1718-9) the coast of that colony. He drove the Spaniards from their fortifications at Pensacola (15 June 1719), and repulsed them at Dauphin Island, near Mobile (19 August); became a captain in 1720; and in 1723 rear-admiral. From 1723 he was governor of Rochefort.

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Le Moyne, Paul, pôl, SIEUR DE MARICOURT, French soldier in America: b. Villemarie, Canada 15 Dec. 1663; d. there 21 March 1704. He was a son of Charles Le Moyne (1626–85) (q.v.). He participated in Troyes' expedition against the English at Hudson Bay, was wounded in the attack on Fort Monsipi (20 June 1686), and remained with his brother D'Iberville (see IBERVILLE) in command of the captured district until 1690. In 1690 he distinguished himself in the defense of Quebec against Phipps, later took part in Frontenac's expedition against the Iroquois, and in 1701 concluded peace with them.

Le Moyne, Paul Joseph, pôl zhō-zéf, CHEVALIER DE LONGUEUIL, French soldier in America: b. Canada 17 Sept. 1701; d. France 12 May 1778. He was the son of Charles Le Moyne (1656–1729) (q.v.). He entered the French army in 1718. He commanded at Fort Frontenac, and was also governor successively of Detroit, Three Rivers, and Quebec. He fought with distinction in various campaigns, and in 1747 marched 180 miles in the depth of a severe northern winter to reinforce de Vaudreuil at the siege of Fort George.

Le Moyne, Pierre. See IBERVILLE, PIERRE LE MOYNE SIEUR D'.

Lempa, lém'pä, San Salvador, a river, the largest of Central America, which rises in Lake Guija on the boundary of Guatemala and San Salvador, flows eastward through a broad and fertile valley for a distance of nearly 150 miles, and then turning abruptly to the south breaks through the volcanic coast range of mountains, and finishes its course of over 200 miles in the Pacific in lat. 13° 12' N., lon. 88° 41' W., 35 miles southeast of San Salvador City. It has numerous large tributaries and is subject to sudden floods. The mouth of the river is obstructed by a bar, but the river is reached by a natural channel connected with the Jaltepeque estuary, and is navigable by small steamers for 100 miles.

Lemprière, John, English classical scholar: b. island of Jersey about 1765; d. London 1 Feb. 1824. He was graduated at Oxford University in 1790, was ordained and began life as a schoolmaster. He afterward was appointed to the livings of Mesth (1811), and Newton-Petrock (1823). He is the author of the well-known classical dictionary (1788), which was founded on Sabatier's 'Dictionnaire des Auteurs Classiques.' He also published: 'Sermons' (1791); 'Translation of Herodotus,' first volume only (1792); and 'Dictionary of Universal Biography' (1808).

Lemures, lem'ū-rēz, among the ancient Romans, a term applied to departed spirits, especially those of ancestors who hovered about during the night. Probably the word was derived from the festival *Lemuria* held 9, 11 and 13 May, when at midnight the father of the family, with special ceremonies, nine times threw black beans over his head, thus banishing the spirits from the household for another year.

Lemu'ria, a name given by Haeckel to a vast area assumed to exist in past ages over the area of the present Africa, Indian Ocean and Malayan archipelago, on the hypothesis that the existence of such a continent was necessary to explain the peculiar present distribution of the lemurs and other phenomena of geographical

distribution. The discovery of the remains of lemurs in America and Europe rendered such hypothesis futile, and the idea was soon abandoned. Consult: Wallace, 'Geographical Distribution of Animals' (1876).

Lemurs, lē'mérz, the curious monkey-like animals, or "half-apes" forming the group *Lemuroidea* within the order Primates, where they stand lowest in rank. They are divisible into three families, *Lemuridae*, *Tarsiidae* and *Chiromyidae*. The last contains only the aye-aye (q.v.); and the second only the Malayan tarsiers (q.v.). The lemurs proper (*Lemuridae*) are confined mainly to Madagascar, but a few are found upon the African continent, and a few others, of peculiar genera, in the Oriental region. They are chiefly arboreal, and more squirrel-like than monkey-like in their manners, and quite harmless, gentle and tamable. They are usually mouse-gray or yellowish, not marked in ornamental ways, the hair is long and often woolly, and the tail usually long, bushy and never prehensile. The hind-legs are longer than the fore-legs in the true lemurs, which move about on all fours, not using their hands as do monkeys, although the thumbs are opposable; the second toe always has a sharp claw, while the other digits bear nails. In the internal anatomy many features are different from the rule of structure elsewhere in the order. The simplicity of the brain, the fact that certain arteries form retia mirabilia, and especially the nondeciduate condition of the placenta, are prominent among these lemuroid peculiarities. In general, however, the lemurs show much resemblance to the *Anthropoidea*.

The *Lemuridae*, or lemurs proper, are divisible into four groups or sub-families. The first group (*Indrisinae*) is limited to Madagascar, and includes several genera distinguished prominently by the great size of the hind-legs, as compared with the fore-limbs; and when upon the ground these lemurs walk erect, balancing themselves by holding their short arms above their heads. The largest is the indri (q.v.), which has no visible tail, while the smallest are the avahis (genus *Avahis*) which are the size of gray squirrels, but have very long tails. A third important genus is *Propithecus*, containing several large brightly colored species, called sifakas, which are mainly vegetarian, go about in large bands like the indris, and seek food in the daytime, whereas the avahis are nocturnal; and are often tamed and taught to hunt like dogs.

The most typical lemurs are in the sub-family *Lemurinae*, which contains several genera, some of which inhabit the Comoro Islands as well as Madagascar. Their limbs are of nearly equal length, and they have a fuller dentition (36 teeth). Among the best known are the so-called "gentle" lemurs; the nocturnal grass-eating bokomboulis (*Hapalemur*); and the handsome and highly arboreal species of the type-genus *Lemur*, which vary greatly in habits, food and appearance. One of these is familiar as the "Madagascar cat" or ring-tailed lemur (*L. catta*), since, unlike the rest, it remains upon the ground, especially about rocks, is easily caught and readily tamed. It is remarkable for the fact that the sexes differ in color, the male being black, while the female is reddish brown with white whiskers and ear-tufts, and the tail alternately ringed with brown and white. The

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ruffed lemur (*L. varius*) is still more strikingly diversified in black and white, and has a ruff of long hair about the neck. All these lemurs survive captivity well and furnish interesting specimens for all zoological gardens.

The third sub-family is that of the *Galaginae*, represented in the continent of Africa and in Madagascar. The galagos (q.v.) have long hind-legs, causing them to hop like kangaroos, when on the ground (but the most of their life is passed in trees), large, semi-naked ears and long tails. Important genera are *Galago* (q.v.); the mouse-lemurs or chirogales (q.v.); and the diminutive squirrel-like dwarf-lemurs (*Microcebus*).

The sub-family *Lorisinae* contains a group of small lemurs, distributed widely in Africa, India, and Malaysia. "In external appearance," remarks Beddard, "all the three genera of this sub-family agree in their small size, their short or entirely deficient tail, large staring eyes, and the rudimentary character, or absence, of the index finger, which is never provided with a nail; in all of them the thumb diverges widely from the other fingers, and the great toe is so divergent as to be directed backward." The ears are small and rounded; and the eyes are very large, and situated close together on the front of the head. They feed on small birds and insects, and are chiefly nocturnal in habits. They inhabit India, Ceylon, and the Eastern Archipelago. The genus *Nycticebus* contains the remarkable "sloth monkey" or sloth lemur (*N. tardigradus*), which is nocturnal, howls dismally at times, and is the object of many fears and superstitions among the Malays and southern Chinese. The genus *Perodicticus* contains the queer African pottos and angwantibos (q.v.). The most typical species of the group is the slender loris (*Loris gracilis*), a pretty little arboreal animal of the Malayan countries, and the subject of many fears and curious superstitions among the Malays and southern Chinese.

The geographical and geological distribution of the lemurs is very interesting. Their remains are found in the rocks as far back as the transition period (Puerto beds) between the Cretaceous and Tertiary, the oldest occurring in the western United States. These are small lemuroids, and similar forms are found in the early Tertiary rocks of Europe, Asia, and Africa. Many genera are known. The most recent, which may have survived in Madagascar until the discovery of that island by Europeans, was *Megaladapis*, which must have been three or four times bigger than any modern species. The circumstance that existing lemurs and certain other animals occur only in south-central Africa, Madagascar and the Oriental region, and nowhere between, was so extraordinary a fact in zoogeography that early attempts to account for it resulted in the hypothesis of an ancient continental land-area, called *Lemuria* (q.v.) which was supposed to connect Africa and southern Asia. This theory had little other foundation, and the subsequent discovery of remains of extinct lemurs in Europe, Western Asia, and the two Americas, showed that it was needless. It is evident that the existing lemurs are the survivors of a once world-wide race which has died out except in certain islands and favorable corners of the world where they are not exposed to cold climates nor to too many enemies. The

almost complete absence of predatory animals in Madagascar doubtless explains the comparatively great number of lemurs characteristic of that isolated country.

Consult: Beddard, 'Mammalia' (1902); Forbes 'Allen's Naturalists' Library' (1894); Lydekker, 'Royal Natural History,' Vol. I., (1893); Mivart and Murie 'Anatomy of the Lemuroidea,' in Trans.-Zool. Soc. of London, Vol. VII. (1872).

Lena, lä-nä' or lē'na, Siberia, one of the largest rivers in the world, rising on the north-western side of the mountains which skirt the western shore of Lake Baikal, about 170 miles east-northeast of Irkutsk. It flows in a winding course, north-northeast and northwest, receiving the Vitim, the Aldan, the Viliui, and other tributaries. Then a mighty stream it flows generally north, till, separating into branches, it forms a great number of deltaic islands, and discharges itself into the Arctic Ocean by several mouths, in lat. 73° N., and lon. about 128° E., having thus passed over 21° of lat. and 22° of lon. Its direct course, through a generally barren country interspersed with a few dense forests, is about 1,480 miles; its actual course, windings included, about 2,770 miles. It is navigable through the greater part of its course, but is frozen from October to May.

Lenapé (lēn'a-pā) Stone, in archaeology, a name given by H. C. Mercer to an inscribed gorget, upon which was incised a spirited combat between men and a mastodon; lightning intervening and aiding the men in the destruction of the beast. The stone told pictorially the legend recorded by Jefferson in his 'Notes on Virginia.' Since its discovery the stone has been condemned by most archaeologists, and not always on the same grounds, and it is probable that it will not be accepted generally as genuine until abundant corroborative evidence has been obtained. If genuine, the stone establishes two most interesting facts concerning the Indians of the Atlantic seaboard; that the mastodon or mammoth was living when these people were at the climax of their cultural development, or, if not a feature of practically our present fauna, then that the advanced Indian lived at a much more remote period than is generally supposed. The evidence now had concerning the mastodon is that it was living about 2,500 years ago, and this antedates the Indian as so advanced an occupant of this region. That man has been an occupant of our seaboard region since the Glacial Epoch is demonstrable, and his contemporaneity with so recently extinct an animal as the mastodon is certain. The principal objection that can be brought against its genuineness is that it is so far in advance of all other known specimens of Indian pictographic art.

C. C. ABBOT.

Lenbach, Franz von, fränts fōn lēn'bāh, German painter: b. Schrobenhausen, Upper Bavaria, 13 Dec. 1836; d. Munich 19 May 1904. He began life as a bricklayer, but at the suggestion of Hofner, the animal painter, turned to the study of art, and became a pupil of Geyer in Augsburg. He subsequently attended the Munich Academy for a short time, and then for two years studied the technique of painting under Gräfe. From 1855 to 1857 he lived as one of the artistic coterie of

LEMURS.



1. Russed Lemur
2. Ring-tailed Lemur.
3. Slender Loris.

4. Ayeaye.
5. Great Galago.
6. Common Loris.

LENCLOS — L'ENFANT

Schrobenhausen, and painted portraits, landscapes, and animals. He then attached himself to Piloty, and as the pupil of that artist accompanied him to Rome. Here he applied himself to the study of the old masters and painted his picture 'The Roman Forum,' whose vivid coloring and grandeur of design made his reputation. After his return to Germany he painted several portraits, which were distinguished by a power of coloring rivaling that of the Venetian school, and a vivid characterization and chiaroscuro which recalled Rembrandt. He was for a few years teacher in the Weimar school of art, but eventually returned to Munich, and attracted the attention of Baron von Schack, who engaged him to visit Italy and Spain for the purpose of making copies of the principal paintings of Giorgione, Velasquez, Titian, Rubens and others. The copies executed by the painter have all the individual tone and color of each original, and he developed immensely his own power and style by their production. This appears most plainly from an examination of his portraits which, original and fresh as they are, show plainly that the master had trained himself in the school of Titian, Rembrandt and Velasquez. Though his drawing is sometimes weak and incorrect, his paintings nevertheless are characterized by powerful modeling, life-like expression, and as a portrait painter he sees to the soul of his sitter with genial and sympathetic intuition. Since his 70th year he has produced an extraordinary number of pictures. He painted the Emperor William in the last year of that monarch's life; he also executed several portraits of Bismarck, and Von Moltke, whose features have become familiar to the world largely from the numerous reproductions of these imitable pictures, now looked upon as classic examples of German art. Bismarck especially appears in these canvases in every attitude and costume, civil and military which he assumed. Many of these portraits are in the picture galleries of Berlin. But he painted in his time every living man of eminence in Europe from Gladstone to Leo XIII. He also executed many pastel portraits as well as single ideal figures ('Sakuntala,' 'Herodias,' etc.). He was a Royal Bavarian professor. A collection of heliogravure reproductions of his paintings was published at Munich in 1891.

Lenclos, lēn-klō, Anne, French courtesan, better known as Ninon de Lenclos; b. Paris 15 May 1615; d. there 17 Oct. 1705. She was famed for her beauty and notwithstanding her reputation, some of the most respectable ladies of the time cultivated her friendship, and in her old age her house was the rendezvous of the most distinguished personages of the city and court. Scarron consulted her on his romances, St. Evremond on his poems, Molière on his comedies, Fontenelle on his dialogues, and La Rochefoucauld on his maxims. Richelieu is said to have been her first lover, and Coligny, Condé, Sévigné, etc., were her lovers and friends. She retained the charms of her manners and conversation, and to some extent of her person, to extreme old age.

Lend a Hand Clubs, organizations of young persons established in the United States in 1871, for religious, philanthropical and social purposes. The name is derived from a story by Edward Everett Hale, entitled 'Ten Times One

is Ten,' published in 1870. Each club creates its own constitution but follows a common motto:

Look up and not down,
Look forward and not back,
Look out and not in,
Lend a hand.

The badge of the club is a Maltese cross, with the inscription 'In His Name.'

Lenepveu, lä-nā-vé, Charles Ferdinand, French composer: b. Rouen 1840. A pupil of Savard, Ambroise Thomas, and Chauvet, he obtained the Prix de Rome in 1865, and was appointed professor of harmony at the Conservatory in 1881 and of composition in 1893. His works include the sacred drama 'Jeanne d'Arc,' first given in the cathedral of Rouen in 1886, several operas, a requiem mass, 'Méditation' for orchestra, and various choral and solo compositions.

Lenepveu, Jules Eugène, zhü'l é-zhān, French painter: b. Angers 1819; d. 1898. He was a pupil of Picot and the Beaux-Arts, won the Prix de Rome in 1847, painted several canvases ('Les Martyrs aux Catacombes'; 'Venetian Night'; 'Hylas'; and others), and executed many frescoes in public buildings at Paris, Angers, and elsewhere.

L'Enfant, lōñ-fāñ, Pierre Charles, French-American engineer: b. France 1755; d. Prince George's County, Md., 4 June 1825. A lieutenant in the provisional service of France, in whose best military institutions he had been trained, he came to America with Lafayette in April 1777; built Fort Mifflin (on the Delaware), which successfully resisted one of the most vigorous attacks of the Revolutionary War; and by his skill as a designer of fortifications attracted the attention of Washington, who made him chief of engineers, with brevet of major of engineers. He remodeled and refitted the City-hall in New York for the use of the first Congress, and later also the Federal House in Philadelphia. Washington and Jefferson selected him to draw the plan for the "new federal town"; and during the spring and summer of 1791 he was employed in the elaboration of his plans. Jefferson wished the design to be that of a chess-board regularity of squares; but L'Enfant broke the monotony of this arrangement by inserting numerous avenues running at acute angles. His plan was approved by Washington, and he was retained to direct the execution of it. The commissioners in general charge of the work advertised a sale of lots for October 1791, and requested L'Enfant to furnish his plan to be engraved and published. This he refused to do, asserting that speculators would purchase the best locations in the "vistas and architectural squares," and "permanently disfigure the city" by "huddles of shanties." For this insubordination Washington ordered his dismissal 1 March 1792. For planning the "federal city" and devoting his time for months to the survey and other preliminary operations, L'Enfant received only \$2,500 and a lot near the executive mansion, a compensation quite in accord with the general economy with which the work was prosecuted. He requested the commissioners to recall the order for the money and "not take any further trouble about the lot." Later, Madison appointed him professor of engineering at West Point, but he declined the post. He designed several public works at Philadelphia, and was appointed to construct the

LENNO LENAPES — LENS

present Ft. Washington (on the Potomac). He partly executed the work, but disagreed with his superiors, and was dismissed. He lived latterly at Chellum Castle, the residence of Dudley Digges, near Bladensburg, Md., and frequented the halls of Congress, seeking in vain for a reward for past services. The execution of his plan for Washington was continued by his assistant, Andrew Endicott, later professor of mathematics at West Point. L'Enfant's design may be viewed in the Library of Congress. To L'Enfant is chiefly due the fact that to-day Washington is one of the most picturesque cities of the world. See WASHINGTON.

Lenno Lenapes, lén'nó lén'a-péz, the native name for the Delaware Indians (q.v.).

Lennox, Charlotte Ramsay, English novelist: b. New York 1720; d. London, England, 4 Jan. 1804. She was the daughter of the lieutenant-governor of New York and was educated in England. She married and being left a widow in narrow circumstances took up literature for support. Her best work is 'Shakespeare Illustrated' (1753-4). She also wrote 'Memoirs of Harriet Stewart' (1751); 'The Female Quixote,' popular in its day (1752); 'Sophia,' a novel (1763); 'The Sisters,' a comedy (1769); etc. She was the friend of Dr. Johnson and Samuel Richardson, from the former of whom she received much literary encouragement.

Lenormant, Charles, shär'l lē-nôr-män, French archæologist and art historian: b. Paris 1 June 1802; d. Athens, Greece, 24 Nov. 1859. He became inspector of fine arts in 1825, professor at the Sorbonne in 1835 and was professor of Egyptian archæology in the Collège de France from 1848 till his death. Among his writings are: 'Thesaurus of Numismatics and Glyptics' (20 vols., 1834-50); 'Introduction to Oriental History' (1838); 'Museum of Egyptian Antiquities' (1835-42); 'Selection of Keramographic Monuments' (4 vols., 1837-61); 'Historical Questions' (2d ed. 1854).

Lenormant, François, frān-swā, French historian and archæologist, son of Charles Lenormant (q.v.): b. Paris 17 Jan. 1837; d. there 10 Dec. 1882. He is one of the foremost of French Assyriologists and from 1874 was professor of archæology at the Bibliothèque. Among his very numerous works are: 'Archæological Researches at Eleusis' (1862); 'Ancient History in the East' (1868-9); 'Letters on Assyriology' (5 vols., 1871-9); 'Akkadian Studies' (3 vols., 1873-9); 'The Primitive Language of Chaldea' (1875); 'Money of Ancient Times' (1879); 'The Beginnings of History according to the Bible' (3 vols., 1880-4); 'Magna Grecia' (1881-3).

Lenox, James, American philanthropist: b. New York 19 Aug. 1800; d. there 17 Feb. 1880. He was educated at Columbia, and in 1839, on the death of his father, a wealthy Scottish merchant of New York, he inherited a fortune of several millions, and 30 acres of land between Fourth and Fifth avenues. After his father's death he retired from business and devoted his time to study, and the collection of fine books, statuary and painting. After some years he became the possessor of the most extensive private collection of books and paintings in the United States. In 1870 he erected a large

and costly building on Fifth Avenue, between 70th and 71st streets, to contain his collection, and this now constitutes the Lenox Library, which he gave to the city on its completion. It is especially notable for its exceptionally large collection of Americana. He founded the Presbyterian Hospital near the library, his gifts to it amounting to \$600,000. He also made important gifts to Princeton College and seminary, and gave liberally to numerous churches and charities connected with the Presbyterian Church.

Lenox, Mass., town in Berkshire County; on the New York, N. H. & H. railroad; about six miles south of Pittsfield and the same distance from the boundary line between New York and Massachusetts. It was settled in 1750 and named in honor of Charles Lenox, Duke of Richmond. The town includes the villages of Lenoxdale and New Lenox. It is noted for its beautiful scenery and healthy climate. Within the town limits are Laurel and Mahkeenac lakes, and spurs of the mountains called the Ledge, Perry Peak, Bald Head, and Mattoon Hill. This locality is largely residential; the industries which contribute to the wealth of Lenox are located mainly in the large cities. Many noted people have been residents of Lenox, among others Nathaniel Hawthorne. Pop. (1900) 2,942.

Lenox College, a coeducational institution, founded at Hopkinton, Iowa, in 1850, and opened in 1859, under the auspices of the Presbyterian Church. It has a preparatory department and classical courses leading to degrees. In 1903 there were connected with the school 15 instructors, and 170 students. The library contains nearly 6,000 volumes.

Lens. A transparent body, generally glass, which refracts the rays of light convergently or divergently. Converging lenses, properly speaking, are called positive (trade designation plus, +), because they bring rays of light to an

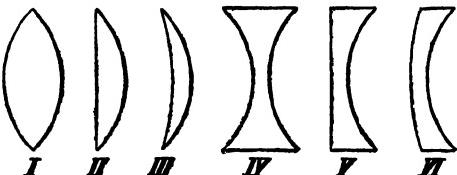


FIG. 1.

actual focus, thus forming a real image. Converging lenses give, under suitable conditions, a magnified image of an object, and one or both of their bounding polished surfaces are convex. The fact of their being thicker in the middle than at the edges distinguishes them from diverging lenses. Diverging lenses are called negative (trade designation, minus, -) because they tend to cause the rays of light to diverge and form, under all conditions, a virtual, reduced image of an object. One or both of their surfaces are concave and they can be distinguished from converging lenses by their being thinner in the middle than at the edges. These two classes of lenses are each divided into three leading types. Those of the positive or convex class are (1) double or bi-convex; (2) plano convex; (3) convex meniscus (trade term, perisopic convex). Those of the negative or

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concave class are: (4) double or bi-concave; (5) plano concave; (6) concave meniscus (trade term, perisopic concave). (See Fig. 1.) Convex lenses converge parallel rays, as shown in Fig. 2, to a point (*c*) called the principal focus

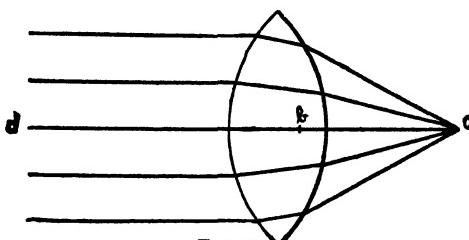


FIG. 2.

or focal point, and the distance from a certain point (*b*), called a principal point, which is usually within the lens, to the focal point (*c*) is the equivalent focal length. The straight line (*d b c*) which passes through the middle of the lens, joining the centres of the curvature of the two surfaces, is called the principal axis.

For brevity, the word "focus" is often used instead of focal length. In a concave lens, the action on parallel rays is opposite to that of a convex lens; instead of converging the light, it diverges the rays away from the axis, as shown in Fig. 3. The imaginary extension of the di-

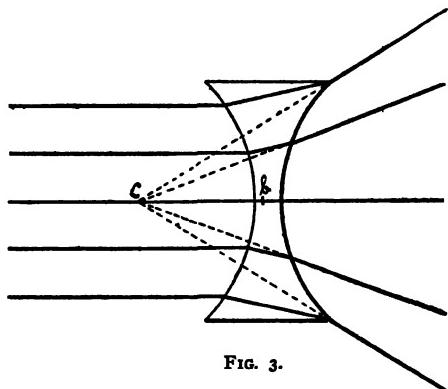


FIG. 3.

verging rays should meet at *c*, and when, as in the case of the convex lens, the incident rays are parallel, the distance from the virtual focus *c* to the principal point *b* is the equivalent focal length. Generally speaking, the real or virtual focus increases with the increase of radius of curvature of the polished surfaces. The power of any lens is the quotient obtained by dividing

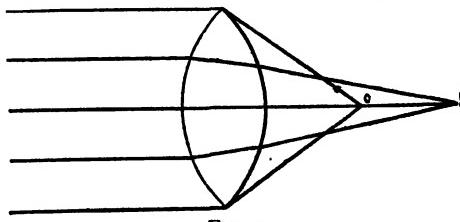


FIG. 4.

unity by the equivalent focal length. A lens is said to be neutralized when combined with one of equal and opposite power, giving the effect

of a plane glass. The distinctness of the image formed by a simple lens depends mostly on the extent to which the spherical aberration and the chromatic aberration are present, the aberrations being greater as the ratio of diameter to focal length increases in a lens of any given type. Spherical aberration of a lens is caused by the rays meeting at different intervals along the axis instead of combining at one point. In Fig. 4, *ol* is the spherical aberration. Chromatic aberration is due to the separation of the light into its different colors, thus causing, in the case of a convex lens, the violet rays to meet at a point *v* nearer the lens than do the red rays at point *r*. In Fig 5, *vr* is the chromatic aberration. Both

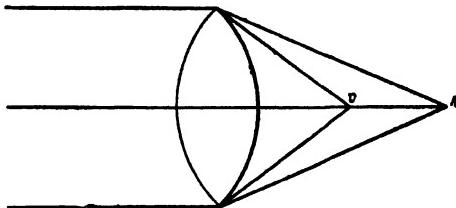


FIG. 5.

of these defects are corrected by means of achromatic lenses.

Up to the present, we have only considered lenses in which the curved surfaces are spherical, and for this reason are called spherical lenses. There are, however, other forms of lenses used, especially for the correction of defects in vision, principally astigmatism, of which the most important has one, sometimes both, of the curved surfaces cylindrical. These are called cylindrical lenses, or cylinders. In these lenses a line drawn along the summit of curvature, parallel to the axis of the imaginary cylinder is called the axis, and must be distinguished from the principal axis of a spherical lens. (Fig. 6.) When the

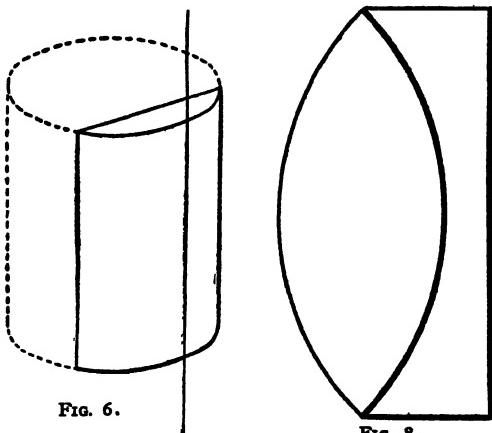


FIG. 6.

lens has two cylindrical surfaces, with the axes at right angles, it is called a "crossed cylinder"; if one of the surfaces is spherical and the other cylindrical, the lens is called a "sphero-cylinder." Another form of lens which has come into use in recent years is the toric (toroidal) lens on which one surface is toroidal, the meridians of the surface are at right angles to each other and

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have radii of different curvature. Its form is illustrated by a section of a bicycle tire. (Fig. 7.)

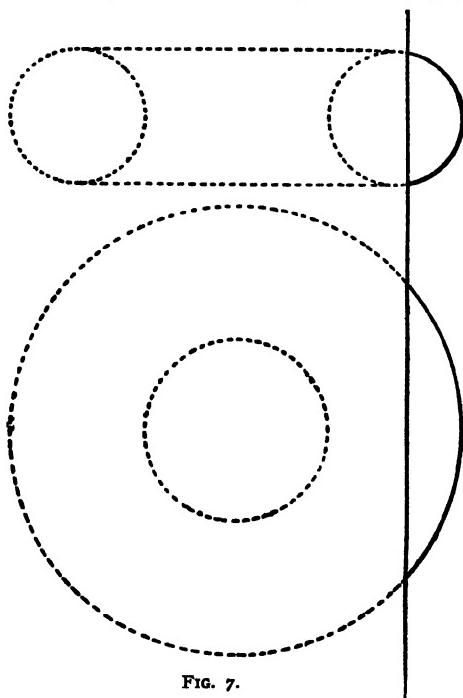


FIG. 7.

History.—The word lens is frequently used to designate a combination of lenses, or of lens-systems, as for example a photographic objective is often called a "photographic lens." The early history of lenses is quite vague. While the magnifying property of glass globes filled with water and presumably of glass beads was known, there is no authentic information that lenses were made and used. There is in the British Museum a piece of rock-crystal about the size of a modern spectacle lens, cut to a plano convex form which was found by Layard during the excavations at Nimroud. Instead of having a spherical surface, it is made up of a series of facets and the crystal is permeated by cloudy striae. Alhazen, who died about 1052, first described the magnifying effect of simple lenses. Spectacle lenses were well known in the 13th century, and their invention is credited to Salvino d'Armatto degli Armati, about 1255. The combination of two single lenses, thus forming a compound microscope, for the purpose of magnifying objects, is believed to be due to Hans and Zacharias Janssen of Middleburg, Holland, about 1590. The discovery of the telescope which is credited to Galileo about the year 1610 was in its original form a combination of a convex lens of long focus with a concave lens of short focus, and this form is still retained in the ordinary opera glass, which is designated as a Galilean telescope. The achromatic lens was the next important invention and was made by Dolland in England in 1758.

Achromatic lens.—In its simplest form is a combination of a converging crown glass lens and a diverging flint glass lens so proportioned that the chromatic aberration is corrected for two colors. These lenses are generally com-

bined by a thin transparent cement which makes them together appear as one lens. (See Fig. 8.) They are also made up of three, four or five lenses.

Aplanatic lens.—A lens or a lens system which is free from spherical aberration.

Apochromatic lens.—An achromatic lens in which the chromatic aberration is corrected for three colors and the spherical aberration is also very perfectly corrected.

Bi-focal lens.—A double focus spectacle lens first introduced by Benjamin Franklin, and now commonly made by adding to or inserting a segment in the lower half of the lens.

Bull's-eye lens.—A plano convex lens of relatively short focus used for illuminating purposes.

Cataract lens.—A short focus convex lens to aid vision after the removal of the crystalline of the eye for cataract.

Coddington lens.—Originally the central portion of a glass sphere but is now generally made a single lens of considerable thickness with convex surfaces, with a circular groove to cut out the marginal rays.

Collective lens.—In a microscope or telescope eyepiece the large lens nearest the objective.

Compound lens (A trade term).—A lens in which combinations of plano, spherical, cylindrical or toric surfaces are made, sometimes to the extent of obtaining a prismatic effect.

Condensing lens.—A convex lens or a system of lenses for concentrating light to a point or on a surface.

Coquille lens (Trade term).—A piece of colored glass of uniform thickness and having concentric spherical surfaces.

Crossed lens.—Either a double convex or double concave lens with the radii of curvature in the proportion of 1 to 6, and giving the minimum amount of spherical aberration.

Crystalline lens.—The double convex lens in the eye situated behind the iris and aiding to form the image on the retina.

Demonstration lenses.—A series of lenses of pronounced curvatures to illustrate the various types of lenses.

Doublet lens.—A combination of two single lenses.

Eye-lens.—The lens nearest the eye in eyepieces (oculars) used for microscopes and telescopes.

Eyeglass lens.—A spectacle lens used to aid vision. As a single lens it is held in position by muscular contraction. The eyeglass with lenses for both eyes is generally accepted to mean the form which is held in position by clamping the nose (French, pince-nez).

Finder lens.—A lens or a combination of lenses attached to a camera to locate an object in the field of view.

Fluid lens.—A lens produced by filling the space formed by two surfaces of transparent media with a suitable media.

Fresnel lens.—A lens formed of a central plano convex or toric convex lens bounded by ring-shaped prisms and lenticular prisms, used to project the rays from a lamp, as in a light-house or signal light.

Immersion lens.—A microscope objective of high power, the front lens of which is connected by fluid to the cover glass of an object, thus giving increased angular aperture.

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Magnifying lens (Magnifier).—A lens or a combination of lenses used to increase the apparent size of an object, usually mounted in convenient form for the pocket.

Pebble lens (Trade term).—A spectacle lens made of rock crystal which is harder than glass.

Photographic lens (also photographic objective).—A lens or a combination of lenses designed for photographic purposes. It is made in a great variety of types, the simplest being the single achromatic convex meniscus lens. The form in most common use is composed of two separated achromatic menisci, with their concave surfaces toward one another (symmetrical, rectilinear, aplanat). The portrait lens is another type having great light-gathering power, and is composed of two separated achromatic lenses, one cemented and the other uncemented (Petzval type). The most modern photographic lens is the anastigmat, invented by P. Rudolph, which is free from astigmatism, a fault present in all earlier types. The new varieties of optical glass made in Jena were first successfully employed in these lenses, by means of which greater perfection in other directions was also attained.

Spectacle lens.—A lens used to correct vision and when two are combined by a bridge which rests on the nose and provided with bows which clasp the temples is now generally termed spectacle.

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Lent (from Anglo-Saxon *Lenc*, spring), the spring or vernal fast of the Christian Church as observed, in preparation for Easter, by members of the Greek, Roman, and Anglican Churches. The original fast of spring which preceded Easter; was of forty hours' duration, this being the number of hours that intervened between the death and resurrection of Christ. Additional days were added, their number varying in different churches. Cassian (420 A.D.) says six or seven weeks was the period in the several churches, but none exceeded 36 fasting days. He affirms that the observance of Lent is not primitive. The historian Sozomen (440 A.D.) writes of the fast "The Quadragesimal fast before Easter some observe six weeks, as the Illyrians and Western Churches; others make it seven weeks, as the Constantinopolitans and neighboring churches." In the first three or four centuries much latitude was allowed in the observance of Lent; Chrysostom recommends, but does not enforce it, insisting on the prior necessity of good works and alms-giving. Distinction of foods was not made in primitive times, when the greatest ascetics ate meat in Lent, though they abstained from eating until the evening. See FASTING, ASH WEDNESDAY, HOLY WEEK.

Len'til, a European leguminous plant (*Ervum lens*), closely allied to the tares and vetches. Lentils are cultivated in southern Europe in two varieties—the large garden lentil and the common field lentil, for the sake of their seeds contained in small pods. The straw of lentils is good food for cattle and sheep, and when mixed with vetches, and sowed as food, are excellent fodder. As food for man they are very nutritious, and in Egypt, Syria, etc., are

a chief article of diet. They are used in soups, etc., in England and America, but not to a great extent.

Lentulus, lén'tü-lüs, the name of a patrician family of Rome of the Cornelian gens. Several of its members distinguished themselves by their virtues and services, while others were less honorably conspicuous. Publius Lentulus Sura, an accomplice of Catiline, was strangled in prison. Lentulus Spinther, one of the most luxurious and ostentatious men of his age, was a partisan of Pompey, but was pardoned by Caesar and joined Brutus and Cassius when they took the field after the assassination of Caesar. To Gneius Lentulus was assigned the command of the legions in Upper Germany during the reign of Tiberius. He was put to death by Caligula.

Leo, lē'ō, the name of six rulers of the Byzantine empire, as follows:

Leo I., called the ELDER: b. Thrace about 400; d. 474. He ascended the throne in 457. After attaining the highest military rank, he was proclaimed emperor by the soldiers in succession to Marcianus. He confirmed the decrees of the Council of Chalcedon against the Eutychians, and renewed the war against the Vandals; but this having resulted in failure the blame was thrown upon his general, Aspar, whom he put to death with his family in 471. The Goths, to revenge the fate of Aspar, poured into the empire, which they laid waste as far as the walls of Constantinople.

Leo II., called the YOUNGER, grandson of Leo I., succeeded his grandfather under the guardianship of his father, who caused himself to be proclaimed emperor a few months afterward. He is said to have been put to death by his own father after reigning from January to November 474.

Leo III., called the ISAURIAN: b. Isauria about 680; d. 18 June 741. Entering the army he became general-in-chief of the army of Asia, under Justinian II. In 716 he marched against Theodosius III., who had been proclaimed emperor on the deposition of Justinian II.; and himself seized the crown the next year. The Saracens, under Solyman, having ravaged Thrace, laid siege to Constantinople, which was defended by Leo, who compelled them to retire. In 726 he ordered all the images in the churches of the empire to be removed, an edict which aroused the memorable contest known as iconoclasm.

Leo IV., grandson of Leo III.: b. 750; d. 780. He succeeded his father, Constantine V., in 775. In his time the controversy raged fiercely between the Iconoclasts, or image-breakers, and their adversaries, both of whom he protected by turns. He repulsed the Saracens in Asia.

Leo V., called the ARMENIAN, from the country of which he was a native, d. 25 Dec. 820. He rose to the rank of general by his valor; but was accused of treason, disgraced, and imprisoned. Michael Rhangabus, on ascending the throne in 811, restored him to his rank; but Leo, profiting by the misfortunes of his master, headed a military revolt and was elected emperor by the troops in 813. He was one of the most violent of the Iconoclastic princes and

LEO

was assassinated before the altar in his palace chapel.

Leo VI., the PHILOSOPHER: b. 865; d. 911. He was the son and successor of Basilius, the Macedonian, and ascended the throne in 886. The Hungarians, Saracens, and Bulgarians having united against the empire, he asked the aid of the Turks, who entered Bulgaria and ravaged it. He drove the patriarch Photius from his seat; and Nicholas, one of the successors of Photius, excommunicated the emperor; for which Leo VI. deposed him. He wrote 'Oracula,' a poem; 'Orationes'; and a celebrated treatise on tactics, printed at Leyden in 1612. Consult: Bury, 'Later Roman Empire' (1887); Oman, 'Byzantine Empire' (1892).

Leo, the name of 13 popes, as follows:

Leo I., Saint, surnamed THE GREAT: b. probably at Rome; d. there 10 Nov. 461. He succeeded Sextus III. in 440 and took decided action against the Manichæans and other heretics. He held a council at Rome against Eutyches in 449, and presided by legates at the General Council of Chalcedon, 451. When Attila invaded Italy, Leo I. who was sent by the Emperor Valentinian to dissuade the invader from his threatened march on Rome, was successful in his mission. He afterward saved the city from being burned by Genseric. His sermons and letters, edited by Ballerini, appeared 1753-7. Consult Arendt, 'Leo der Grosse und seine Zeit' (1835); Gore, 'Leo the Great' (1880).

Leo II., Saint: b. Sicily; d. 683. He succeeded Agatho in 682. He confirmed the decrees of the sixth general council and was instrumental in raising the grade of church music and improving the Gregorian Chant. He was succeeded by Benedict III.

Leo III., Saint: b. Rome; d. there 25 May 816. He succeeded Adrian I. in 795 and his first official act was to acknowledge the suzerainty of Charles the Great (Charlemagne) by sending him the keys of St. Peter's and the standard of the city of Rome. His rule was much disturbed by outbreaks and conspiracies in Rome and in 799 he was obliged to ask the protection of Charles. In the following year, 800, Charles visited Rome, and was there crowned by the Pope, emperor of the Romans.

Leo IV., Saint: b. Rome; d. 7 July 855. He succeeded Sergius II. in 847. The Saracens having invaded the Ecclesiastical States, he marched against them and obtained a complete victory; after which he built the Leonine wall encircling the Vatican quarter, restored the town of Porta, colonizing it with Corsicans, and founded the town of Leopolis, now deserted, some 12 miles from Civita Vecchia.

Leo V.: d. 6 Dec. 903. He was a Benedictine monk who, in 903, succeeded Benedict IV., but was imprisoned by his chaplain Christopher, and died soon after.

Leo VI.: d. 3 Feb. 929. He succeeded John X. 6 July 928, and is said to have been put to death by Marozia.

Leo VII.: d. 939. He succeeded John XI., son of Marozia. He successfully negotiated a peace between Hugo, King of Italy, and Alberic, Duke of Rome, the son of the celebrated Marozia, and is reported to have been an

irreproachable man and zealous ecclesiastic. His successor was Stephen VIII.

Leo VIII.: d. 965. He was intruded in the pontificate on the pretended deposition of John XII., in 963, under the patronage of Otho I., but on Otho's withdrawal John re-entered Rome, and drove away Leo. John's death occurring soon after, Benedict V. was chosen pope. The Emperor Otho subsequently took Rome, and after the banishment of Benedict again intruded Leo, who shortly after died.

Leo IX., Saint (BRUNO): b. Alsace 21 June 1002; d. Rome 19 April 1054. He was cousin to Emperor Conrad the Salic, and became bishop of Toul at 22. At the Diet of Worms, in 1048, he was elected to succeed Damasus II. as Pope. He applied himself to the reform of discipline in the Church, holding several councils against simony and concubinage. In 1058 he opposed the Normans in Italy, but was taken prisoner by their leader, Robert Guiscard, at the battle of Civitella, and confined at Benevento ten months. Falling ill he was allowed to return to Rome. Consult Hunkler, 'Leo der Neunte und seine Zeit' (1851).

Leo X. (GIOVANNI DE' MEDICI, jō-vän'nē dā mā'dē-chē): b. Florence 11 Dec. 1475; d. Rome 1 Dec. 1521. He was the second son of Lorenzo the Magnificent, and his father had him made a cardinal by Innocent VIII. at the age of 13. When the Medici were expelled from Florence, in 1494, he spent some years in travel in Germany, France, and Flanders, and made acquaintance with many eminent men, returning to Rome in 1503 and devoting himself to science and the fine arts. He was appointed by Julius II. legate with the papal army, and in 1512 was taken prisoner by the French at the battle of Ravenna, regaining his liberty only after the evacuation of Milan by the French. In 1513 on the death of Julius II., he was elected Pope, and made his entry into Rome on 11 April, the anniversary of his capture at Ravenna. His pontificate of nine years is one of the most eventful of modern history, when viewed in relation to great political changes, to the revival of literature and, above all, to the Reformation. He succeeded in putting an end to the disputes between Louis XII. and the court of Rome; he continued and brought to a close the Council of the Lateran; and, at a conference held at Bologna, concluded a concordat with Francis I. of France. In 1517 he created the unexampled number of 31 cardinals, among whom were Cajetan, Campeggio, Trivulzio, and other learned and eminent men. He planned a great war against the Turks, and resolved about the same time to complete the church of St. Peter at Rome, and in order to raise funds for these schemes he granted to all the faithful, who should contribute by their alms, certain indulgences, the preaching of which in Saxony was one of the forces which resulted in the Reformation. Leo published his first bull against Luther in June 1520, and Luther appealed to a general council and publicly burned the bull at Wittenberg.

A second bull appeared against Luther in January 1521, and the papal anathema was echoed by the doctors of the Sorbonne. At the same period war was resumed between the Emperor Charles V. and Francis I., the Pope



POPE LEO XIII.

LEO

allying himself first with Francis and soon after with Charles. As an intelligent patron of literature and the fine arts, he was surrounded with many of the most distinguished men of his time. He stimulated the study of Greek and the collection of ancient manuscripts; restored the Roman University and the great Laurentian Library of Florence. Consult: Roscoe, 'Life and Pontificate of Leo X.' (1805); Creighton, 'History of the Papacy During the Period of the Reformation,' Vols. III.-V. (1882-94); Niti, 'Leone X. e la sua politica' (1892); Conforti, 'Leo X. ed il suo secolo' (1896).

Leo XI. (ALLESSANDRO OTTAVIANO DE' MEDICI, äl-lés-sán'drō öt-tä-vē ä'nō dā mā-dē-chē): b. Florence 1535; d. 21 April 1605. He was consecrated Bishop of Pistoria 1573, became Archbishop of Florence in 1574 and entered the college of cardinals. On 1 April 1605 he became pope. He survived only 26 days after his election.

Leo XII. (ANNIBALE DELLA GENGA, än-né-bä'lä dë'l'a jén'ga): b. near Spoleto 1535; d. 10 Feb. 1829. He entered the priesthood in 1783, was made titular archbishop of Tyre ten years later and became a cardinal in 1816. In 1823 he succeeded Pius VII. He was a strong opponent of secret societies, such as the Freemasons and the Carbonari. Consult Artand de Montor, 'Histoire du Pape Leon XII.' (1843).

Leo XIII. The death of Leo XIII., on 20 July 1903, excited the most intense interest throughout the world. The Pope had been ill for many days, and each detail of his sickness had been minutely described and cabled by Roman correspondents to all parts of the civilized world. This, in ordinary cases, might have lessened a sympathy, which, as time went on and the august patient lingered, had become almost strained; but in his, it did not. Irrespective of creed, men's reverence followed the Pontiff to the very tomb, and no discordant voice was heard to break the chorus of esteem for one whose moral force had made sectarian bitterness ashamed of itself.

The death of Leo XIII., philosopher, poet, statesman and priest, has shown that theological hatreds are on the decline.

In Carpineto, on 2 March 1810, Joachim Vincent Raphael Lodovico Pecci was born. His father was Count Domenico Lodovico Pecci, then—1810—in his forty-first year and his mother Anna Prosperi-Buzi, then in her thirty-seventh. The palace in which Joachim was born was the country house of the family, high in the mountains.—a nest for an eagle. Count Lodovico Pecci confided his sons, Joseph and Joachim (or Vincent) to the Jesuits of Viterbo, who very recently had been restored by Pius VII. to the privileges of which Clement XIV. had deprived them. In 1818, Joachim Pecci began his education in the Jesuit college of Viterbo. He was a fragile boy,—this boy who was to become Pope at 68 and whom death found it hard to conquer at 93—and he knew nothing of the happy robustness of other boys, in spite of his frequent vacations in his native hills. That devotion to the Greek and Latin classics which later gave him fame as a poet, showed itself early. At the age of twelve he was skilled in writing Latin

verse. There still exists an epigram for the provincial of the Jesuits,—

Oh, utinam possem Peccius ipse sequi.

In 1824, Leo XII. carried further the plans of Pius VII. and re-opened the Roman College of the Society of Jesus. This college is likewise known as the Gregorian University. Young Pecci entered and applied himself to his studies with so much earnestness that his health gave way, and, in 1830, though he received the highest honor—that of being chosen for a public disputation in philosophy on theses taken from the whole course,—the Prefect of Studies was obliged reluctantly to excuse him. Still he strove for that perfect health which was denied him. He was a mighty hunter and his gun,—very old-fashioned, with a barrel decorated in the Arabian manner,—is still preserved, and he walked great distances.

In 1832, Joachim Pecci took the degree of doctor, with all possible honors, chiefly recorded in the annals of the Sapienza University. In the College of Noble Ecclesiastics he studied Canon and Civil Law. In 1837, Gregory XVI. named him domestic prelate, and he became known as Monsignor Pecci. On the last day of the year 1837, he was ordained priest by Cardinal Odescalchi, the Vicar General of Gregory XVI. One of the most important epochs in the history of Mgr. Pecci is his administration of the Duchy of Benevento. It was the haunt of smugglers and brigands, licensed by public opinion and supported by noble families. It had given Gregory XVI., who was a lover of justice and order, profound anxiety. At the age of twenty-eight Mgr. Pecci was made Delegate and sent to do what the Neapolitan neighbors of Benevento sneeringly said was "impossible." Mgr. de Z'Saeclaes well says that his government of Benevento is "a little epic." He was then called to Spoleto. From thence he went to Perugia, where he busied himself in perfecting measures for the economic and educational progress of the place. The capital of Umbria still reveres him as its benefactor, and his records at Benevento and Perugia,—one destructive of evil, the other constructive of good,—indicated what his future was to be. Early in January 1843, he was chosen for a difficult diplomatic post, the Nunciature at Brussels, and on 19 February he was consecrated Archbishop of Damietta. In Belgium the educational question was burning, and in March 1843, when Archbishop Pecci presented himself to the Court of Brussels, the veteran diplomats smiled at the prospect of a struggle between the Papal Nuncio and that Leopold of Saxe-Coburg, who held the winning cards. The Queen's sympathies were with the Nuncio; she believed in religious education, but the feeling against the "Ultramontanes" ran high; notwithstanding, the Nuncio succeeded in gaining the good-will of all classes and gradually overcoming rancour. This made it all the more astonishing that he should have been recalled from Brussels in 1845. In 1846, he visited London and Paris. He was destined to be Bishop of Perugia; Gregory XVI. died shortly after his arrival in Rome. Pius VIII., the predecessor of Gregory, was followed by another Pius,—Cardinal Mastai Ferretti—who appreciated the value of Pecci so greatly that he felt that as Archbishop of Perugia the late

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Nuncio to Brussels could be of more service in healing internal discord than in placating foreign kings and cabinets. He was really, in 1846, only Bishop of Perugia, but as he had been the Titular Archbishop of Damietta, he retained the higher title. He was preconized, — solemnly proclaimed in conclave,— the Bishop of Perugia, on 19 Jan. 1846, and on 26 July he made his solemn entry into the capital of the country of St. Francis d'Assisi. From 1846 to 1878, he ruled in Perugia. He was, in the language of the Psalmist, both a ruler and a shepherd. In the Consistory of 18 Dec. 1853, he was created Cardinal. During his long episcopate, he found the world in miniature in Perugia. The growing antagonism against the church haunted him. He was all for the things of the spirit,— the things of the mind, postulating the truth of the divinity of Christ and the reality of his birth, death and resurrection. In this line, he refutes the claims of Renan, in his 'Life of Jesus,' as eagerly as he refutes false Socialism later, in a Papal Letter.

On 7 Feb. 1878 Pius IX. died. On Monday, 18 February, the Cardinals met in conclave. Pecci, as Cardinal Camerlengo, walked last in the procession. On Wednesday, 20 February, by a vote of forty-five out of sixty-one, Cardinal Pecci became Pope. From 20 Feb. 1878 to 20 July 1903, Leo XIII. was constantly active. He restored the Catholic hierarchy to Scotland, early in 1878, and issued his first Encyclical, *Inscrutabile*, against the forces at work for the disintegration of society — putting strong accent on the disregard of the sacramental character of marriage.

In 1878-9 Leo XIII. was in a most difficult position with the Government of Germany. This later year marks the beginning of the decay of the Kulturkampf which strengthened the Centre party in Germany and which made the name of Bismarck detested by German Catholics at home and abroad. In 1879 came the Encyclical, *Quot Apostolici*, followed by the *Aeterni Patris* — all encyclicals taking their names from the opening words. The first was aimed at that Socialism "which attacks all that has been wisely decreed by human and divine laws for the protection and ornament of life"; the second is an exposition of the claims of St. Thomas Aquinas as a philosopher.

Another important encyclical,— it is not possible to name them all,— appeared on 12 Feb. 1880. It was the *Arcanum*, on Christian marriage. Another, 29 June 1881, was the encyclical *Diuturnum* in favor of rightful authority. "The Church," he said, "was everywhere the friend of honest liberty; she detested tyranny." In 1882 he strove to keep the Irish movement within legal bounds. The encyclical *Etsi Nos*, of February 1882, gave rise to the rumor that he would leave Rome, so "intolerable" had the situation become. In 1890, the world gradually learned that for six years every historical document in the Vatican had been at the service of scholars. He omitted nothing that could add to the progress of historical science. The encyclical, *Humanus Genus*, was aimed at Freemasonry, which assumes an atheistical and anti-religious aspect in Latin countries.

Leo XIII. was aroused to intense enthusiasm for the work of Cardinal Lavigerie in breaking down the slave-trade in Africa, and his encyc-

lical, *In Plurimis*, 5 May 1888, is evidence of his detestation of slavery. It is addressed to the bishops of Brazil. The prudence with which Leo XIII. handled the question of the Knights of Labor was due to the tact he possessed of discovering the best advisers. There were forces at work urging the condemnation of this society; but, owing to the sanity and energy of Cardinal Gibbons, Cardinal Manning and Mgr. O'Connell, now rector of the Catholic University (1903), a disaster by which suspicion and dislike to the Church might have been excited was avoided.

The relations between the late Pope and the United States of America were very close. He appreciated the messages of President Cleveland; and he frequently expressed himself touched by the respect with which President Roosevelt, representing the American people, treated him. He established the Catholic University at Washington, and constantly expressed interest in it. Leo's interest in the Columbian Exposition at Chicago surprised Europe. His solicitude for the Church in America was profoundly shown in the Apostolical letter, *Testem Benevolentia*, on "Americanism," in which he paternally determines and settles a point for some time in controversy among American Catholics. In the beginning of the year 1893, Mgr. Satolli, afterward Cardinal, became the first Apostolic Delegate to the United States. This is not a diplomatic but a purely ecclesiastical office. Cardinal Satolli was succeeded by Mgr., now Cardinal, Martinelli, and (1903) by Mgr. Falconio, late delegate to Canada.

The efforts of Leo XIII. to direct attention to the study of the Scriptures are historic. Perhaps of all his letters which have a diplomatic character, that written to the French in 1892 caused the greatest discussion. It was received by French Royalists with ill-concealed disgust. There is no question that the pontificate of Leo XIII. was of vital value in the history of the last quarter of a century.

As a poet, Leo XIII. wrote exquisite Latin verse, a translation of which has been made by the Jesuit fathers at Woodstock, Md., and a later and fuller one by Dr. Hugh Henry, of Overbrook Seminary, in Pennsylvania.

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Leo ("the lion"), in astronomy, the name given to one of 12 zodiacal constellations. It contains about 100 stars visible to the naked eye, the chief star being Regulus. The sun enters the sign Leo about 21 July. Leo Minor, the Lesser Lion, is a constellation found by Hevelius about 1691. None of its stars reach the fourth magnitude. Leonides are meteors radiating from the vicinity of Leo, usually seen about 14 November.

Leo Minor. See LEO.

Leochares, lē-ōk'a-rēz, Greek sculptor of the 4th century B.C. He was a pupil of Scopas, and Pliny ascribes to him the sculptures on the west side of the Mausoleum at Halicarnassus. He was one of the artists privileged to make portraits of Alexander the Great. Three statues of Zeus are known to have been executed by him, and his 'Ganymede carried off by an Eagle' was famed throughout the ancient

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world. With Lysippus he produced a colossal bronze group representing Alexander at a lion-hunt. The works of Leochares are all lost, but there is a copy of the Ganymede in the Vatican; and a bust of Alexander may be a copy of one of his.

Leominster, lēm'īn-stēr, Mass., a town of Worcester County, 40 miles west-northwest of Boston, on the Nashua River, and on the New York, N. H. & H., and the Boston & M. R.R.'s. The town is well laid out, has handsome residential sections, six churches, twenty schools, a public library of over 18,000 volumes, and a fine park. Leominster is well lighted with gas and electricity and has a good water supply and abundance of water power, the waterworks being municipalized. It is a busy industrial centre, the home of the comb-manufacture of the State, of piano cases and pianofortes, has large cabinet works, paper mills, tanneries, and extensive manufactures of cement, bricks, yarn, jewelry, toys, buttons, and hairpins. The town is surrounded by some of the most fertile farm land in the county, and horticulture and floriculture are growing industries. Leominster, settled in 1725, was part of Lancaster until 1740 when it received a charter of incorporation. Pop. (1900) 12,392.

Leon, lā-ōn', **Antonio**, Mexican soldier: b. 1794; d. 1847. Having abandoned the side of the royalists for that of the insurgents under Iturbide, he distinguished himself in 1821 by the capture of Tehuantepec, for which he was made lieutenant-colonel. When, however, Iturbide proclaimed himself emperor, the support of Leon was given to Gen. Bravo, the republican leader. In 1824, as deputy from Oaxaca, he served in the Constituent Congress, and later he aided in quelling insurrection against the authority of the republic. He was killed at the battle of Molina del Rey in the war with the United States.

Le'on, Iowa, town, county-seat of Decatur County; on the Chicago, B. & Q. and the Keokuk & W. R.R.'s; about 68 miles south of Des Moines, and nearly midway between the Mississippi and the Missouri rivers. It is situated in a fertile agricultural region, and its industries are connected chiefly with farm products and live-stock. It is the trade centre for nearly all of Decatur County. Pop. (1900) 1,905.

Leon, lā-ōn', city in Nicaragua, on a large and fertile plain 13 miles from the Pacific coast. It is laid out on a regular plan, in spacious streets, with intervening squares. The public buildings are considered among the finest in Central America, and include a large and massive cathedral, crowned by a lofty central dome, and flanked by two towers. Other buildings are the old Episcopal palace (built 1678), surrounded by fine gardens; the new Episcopal palace (1873), the churches of La Merced, Recolección, and Calvario, remarkable for their size and fine façades, and various other churches; the Tridentine College of St. Ramon, once a flourishing establishment, with professorships of law and medicine, and numerous students, but now possessed only of a nominal existence; the government-house, Cuartel General or head barracks, and the hospital, occupying the old convent of San Juan de Dios.

The manufactures of Leon are confined chiefly to articles in dressed leather and cutlery; and the trade, owing to its inland situation, does little more than supply its local wants, but the railway between Leon and Corinto on the coast has somewhat improved it. The markets display fruits and vegetables in great variety and almost boundless profusion. Pop. (1900) 32,000.

León, Philippines, a pueblo of Iloilo, Luzon, situated in the southwestern part of the province near a river, 15 miles northwest of the provincial capital, Iloilo. Pop. 14,000.

Leon, Spain, (1) an ancient northwest province and former kingdom, united to Castile in the 11th century, and now divided into the provinces of Leon, Zamora, and Salamanca; (2) a modern province in the north, with an area of 5,936 square miles and a population (1900) 380,083; (3) a city, the capital of the province, on the Bernesga, 176 miles northwest of Madrid. It is of mediæval appearance, surrounded by dilapidated walls, and has a beautiful park and some fine ecclesiastical structures, including a perfect Gothic cathedral. Pop. (1900) 17,022.

Leon de los Aldamas, dā lōs āl-dā'mās, Mexico, city in the state of Guanajuato, 32 miles west of the capital of the district. The town is well built and prosperous and is in the centre of a rich agricultural district. It has a public square, cathedral, convents and schools, and has numerous industries including cotton and woolen mills. The town was founded in 1576. Pop. (1900) 48,000.

Leon, Ponce de. See **PONCE DE LEON**.

Leonard, lēn'ērd, **Abiel**, American Protestant Episcopal bishop: b. Fayette, Mo., 26 June 1848; d. Salt Lake 23 Dec. 1903. He was graduated at Dartmouth College in 1870, and at the General Theological Seminary, New York city, in 1873. Entering the ministry of the Protestant Episcopal Church, he served in Missouri and Kansas until 1888, when he was consecrated bishop of Salt Lake.

Leonard, Daniel, American jurist: b. Norton, Mass., 29 May 1740; d. London, England, 27 June 1829. He was graduated from Harvard in 1760 and after studying law became a Whig member of the General Court. Disapproving of the extreme measures of the Whigs, his sympathies were with the Loyalists and his papers signed 'Massachusetts' and published in a Boston newspaper in 1774-5, were replied to by John Adams over the signature 'Novanglus.' Leonard's articles ably defended the position of the English government and they constituted the strongest statement of that position put forth in the colonies. In 1776 he went with the English army to Halifax, N. S., and was among those named in the banishment act of 1778, while his property was confiscated by the act of 1779. He went to England from Halifax and was subsequently for many years chief justice of the supreme court of Bermuda. In 1819 John Adams published the 'Novanglus and Massachusetts' with a preface. Consult Tyler, 'Literary History of the American Revolution.'

Leonard, James Francis, American telegrapher: b. Kentucky 1804; d. 1862. He was

LEONARD — LEOPARD-CAT

practically the earliest telegrapher to read messages by sound and for his time was the swiftest telegraph operator in the world. In the summer of 1848 he began to receive messages by sound and soon afterward received and wrote out 55 words a minute for Professor Morse, as a test of the invention. He is buried in Frankfort, Ky., where his grave is marked by a monument erected by telegraphers.

Leonard, William Andrew, American Protestant Episcopal bishop: b. Southport, Conn., 15 July 1848. He was educated at Phillips Academy, Andover, Mass., and St. Stephen's College, Annandale, N. Y., and was graduated at the Berkeley Divinity School, Middletown, Conn. In 1873 he was ordained a priest; became assistant at Holy Trinity Church, Brooklyn, N. Y., rector of the Church of the Redeemer there, then rector of Saint John's Church, Washington, D. C., and was chaplain of the 23d regiment of the National Guard of New York and of the Ohio Society in that city. He is now (1904) bishop of Ohio, having been consecrated 12 Oct. 1889. His writings include 'Via Sacra, or Footprints of Christ'; 'History of the Christian Church'; 'New York Church Club Lectures'; 'A Faithful Life'; 'Witness of the American Church to Christianity' (Bedell Lectures, 1894); etc.

Leonardo da Vinci, lā-ō-när'dō dā vēn'chē. See VINCI.

Leoncavallo, Ruggiero, rūd-jā'rō lā-ōn-kä-väl'lō, Italian composer: b. Naples, Italy, 8 March 1858. He was educated at the Naples Conservatory of Music and for many years resided as a teacher in Paris, where he composed songs and fugitive pieces. Under the influence and encouragement of Wagner he wrote his trilogy 'Crepusculum,' a drama of Italian history, of which 'Medici' is the first part. He is best known by his operas 'I Pagliacci' (1892); and 'La Bohème' (1897). Other works by him are 'Tomaso Chatterton' (1896), a popular opera; and 'Serafitus-Serafita,' a symphonic poem.

Leonidas (lē-ōn'ī-dās) I., king of Sparta: d. 420 B.C. He was a son of King Anaxandrides, and ascended the throne 491 B.C. When Xerxes invaded Greece, the Greek Congress assigned to Leonidas the defense of the pass of Thermopylae. His force, according to Herodotus, amounted to over 5,000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path, by which Hydarnes led a body of Persians to attack Leonidas in the rear. Before this maneuver could be completed, Leonidas, dismissing all his allies except the Thespians and Thebans, advanced from the pass and threw himself upon the main body of Xerxes' army. He fell early in the action, and a desperate struggle afterward took place over his body, which was rescued by the Greeks.

Leonides, or Leonids. See LEO.

Le'one'ne Verses, a kind of Latin verse, in vogue during the Middle Ages, consisting of hexameters and pentameters of which the final and middle syllables rhyme. They are so called from Leonius, a poet of the 12th century.

Leon'todon. See HAWKBIT.

Leopard, lēp'ard, or **Panther**, one of the great cats widely distributed over Africa and Asia, and prehistorically prevalent in southern Europe. The general color is yellowish fawn, which becomes white on the under aspect of the body, marked with black spots of various sizes, irregularly dispersed; these spots are often rosette-like, but do not enclose a central spot as is the case with its American analogue, the jaguar (q.v.). Black examples often occur. In general appearance and conformation the leopard is tiger-like, but is considerably the inferior of the tiger in size and weight, measuring on the average about three feet and ten inches from the nose to the root of the tail, which is almost as long as the body. This beautiful cat is, however, the peer of the tiger, making up in agility, quickness and wit for its defects in weight and power. Its prey consists of any animal it is able to pounce upon or overcome, and among the native villages and herdsman of both India and Africa it is dreaded as a destroyer of cattle and sheep, since, like the American puma, when it invades a cattle-pen or sheep-fold it kills many times more animals that it can eat or carry away,—a hundred sheep in a night. Nevertheless, leopards have always been among the partly tamed and trained animals of shows, and they thrive well and breed in captivity.

The leopard—which is more commonly called "panther" in India—frequents mainly wooded and rocky regions, where it can take refuge in trees, or seek among their limbs the birds, monkeys and other arboreal creatures that form a fair share of its food. It does not hesitate to attack large prey, but can rarely overcome a buffalo or one of the larger African antelopes unless the animal is taken at a great disadvantage. Not more than one pair is usually found in a given district; and they make their lair in some rocky jungle, where once a year two to four kittens are born to them, which remain with their mother until they are well grown. One hears less of man-eating leopards than of lions and tigers with the habit of attacking human beings; but the leopard is more widespread, numerous and subtle than either of the others and doubtless is the real perpetrator of many homicides attributed to the larger cats. At any rate the leopard is regarded by those familiar with him as quite as formidable a beast to encounter, and sportsmen adopt the same methods and use the same precautions as when they are pursuing the tiger. A most excellent summary of leopard-hunting experiences may be read in Porter's 'Wild Beasts' (New York, 1894). For the leopard in India consult Sanderson, 'Thirteen Years among Wild Beasts in India' (1893); Forsyth, 'Highlands of Central India' (1889); Hornaday, 'Two Years in the Jungle,' and similar writers. The Persian leopard is described at length in Blanford's 'Zoology of Persia' (1876); and the African by Baker, 'Wild Beasts and their Ways' (1890); Drummond, 'Large Game and Natural History of Southeast Africa' (1875); and many other sportsmen-travelers in that continent. See CHEETA; SNOW-LEOPARD.

Leopard-cat, a highly variable, tawny, much-spotted cat about two feet long in body, and with a long tail, which dwells in northern

LEOPARDS.



1. The Leopard or Panther. 2. Snow Leopard or Ounce. 3. Hunting Leopard or Cheetah.

LEOPARD-FLOWER — LEOPOLD

India but is not well known. It is called *Felis bengalensis* by Elliot and also by Mivart, but its identity is doubtful.

Leopard-flower. See BLACKBERRY LILY.

Leopard-frog. See FROG.

Leopard-moth, a large European tussock-moth (*Zeusera pyrina*), white spotted with black, whose caterpillars bore into the limbs of forest and shade trees, and so weaken them that they die or are easily broken by the wind. This moth has been introduced to America in the neighborhood of New York where it is one of the pests in the parks.

Leopard-shark, a handsomely variegated small shark (*Triakis semifasciatum*), often seen along the coast of southern California.

Leopardi, Giacomo, já'kō-mô lá-ô-pär'dé, COUNT, Italian scholar and poet: b. Recanati, in the marshes of Ancona, 29 June 1798; d. Naples 14 June 1837. He devoted himself from an early age to study in the fine library of his father, and when he reached his 15th year was master of Latin and Greek, and had soon read most of the literary masterpieces of antiquity. In 1815 his translation of Porphyry's 'Life of Plotinus' was followed by his 'Saggio sopra gli Errori degli Antichi.' He was of profound poetic genius and mourned over the degraded political condition of his native land, a feeling which found utterance in his magnificent 'Ode to Italy' a poem which proclaimed him the first of modern Italian singers. In 1822 he went to Rome and attracted the attention of Niebuhr by his criticism of a new edition of the 'Chronicon of Eusebius'; and the great historian attempted in vain to settle him as professor in the University of Berlin. Leopardi was broken in health, as well as in spirit, and his unhappiness was intensified by an unhappy love affair. Bunsen offered him such a professorship and it was declined. He left Rome to travel in Italy, his tour embracing many of the great northern cities, and ending with Naples. He developed the most absolute skepticism, and the unhappiness of his lot made him a pessimist. His sight failed and he was forbidden to take up a book, and though he was a linguist of rare accomplishments, wrote in Greek and Latin with equal ease, had mastered French, Spanish, and English, he could apply his attainments to no practical end. His classic training had, however, given him a power and precision in the use of his native tongue, which was unprecedented in his day. His early lyrics were written between 1816 and 1824, and are distinguished for lucidity, genuine feeling and brilliant command of metre and rhyme. His most famous poem, however, is 'La Ginestra' (1836), in which he gives full expression to his hopeless creed, and his poetic productions, some 39 remain to this day the finest and most imperishable utterances of the Italian lyre. His other works include translations, and critical treatises, and after his death were published his prose works, a miscellany of peculiar interest. His 'Epistolario,' a collection of his letters, illustrates his personal life. Consult: Autard, 'Essay sur les Idées philosophiques et l'Inspiration poétique de Giacomo Leopardi' (1877); Ranieri, 'Sette Anni di Sodalizio con Giacomo Leopardi' (1880); Cappalletti, 'Bibliographia Leopar-

diana' (1882); Cesareo, 'Nuove Ricerche su Giacomo Leopardi' (1893).

Leopold (lé'ô-pöld) I. (GEORGE CHRISTIAN FREDERICK), king of the Belgians: b. Coburg 16 Dec. 1790; d. Laeken 10 Dec. 1865. He was the son of Francis, duke of Saxe-Coburg, and after receiving careful literary and scientific education became a general in the Russian army and was present at the battles of Lützen, Bautzen, and Leipzig. While in England after the peace of 1815 he married Princess Charlotte, heiress of the throne, and was naturalized by act of Parliament in 1816. The princess died in 1817; and Leopold 12 years later married morganatically Caroline Bauer. In February 1830, he was offered the crown of Greece, but declined it. In June 1831, he was elected by a national congress king of the Belgians, and was crowned at Brussels in the following July. He ruled with great prudence, having continual regard to the principles of the Belgian constitution. His daughter, Carlotta, was the wife of Maximilian, emperor of Mexico. Consult Juste, 'Les Fondateurs de la Monarchie belge, Leopold Ier Roi des Belges' (1868) an English translation of which appeared, entitled 'Mémoires of Leopold I.' (1868); Taillandier, 'Le roi Leopold et la reine Victoria' (1878).

Leopold II., LOUIS PHILIPPE MARIE VICTOR, king of the Belgians: b. Brussels 9 April 1835. He is a son of Leopold I. and was married in 1853 to Marie Henriette, Archduchess of Austria (b. 1836; d. 19 Sept. 1902), daughter of Archduke Joseph of Austria. He early manifested an interest in Africa and in 1876 organized at Brussels the African International Association, the aim of which was to utilize African discoveries. He assisted Stanley in the latter's explorations of the Congo. The Berlin Conference of 1885 established the Congo Free State and conferred its sovereignty upon King Leopold.

Leopold I., emperor of Germany: b. Vienna 9 June 1640; d. there 5 May 1705. He was the 4th son of the emperor Ferdinand III. of the house of Hapsburg, and of Maria Anna of Spain, and was educated for the church, when the death of his brothers made him heir to the throne of his father. Previous to the death of the latter in 1657, Leopold had been crowned king of Hungary; still mainly in Turkish hands. The war with the Turks having been renewed in 1660, Montecuculi won the battle of St. Gotthard on the Raab (1 Aug. 1664), which was followed, however, by a peace which the Hungarian partisans of the emperor regarded as ignominious. In 1678 occurred the great insurrection under Tökolyi, and in 1683 the Turkish invasion of Austria under Kara Mustapha. Leopold fled from Vienna, but John Sobieski's great victory saved his capital and thrones. Buda was retaken after a memorable siege in 1686, and the victories at Zalánkemén (1691) and Zenta (1697) led to the peace of Carlovitz (1699), which also secured the possession of Transylvania. But neither the wholesale executions of Hungarian patriots at Eperies, nor the acquiescence of the diet of Presburg in the proposition to make the male line of the Hapsburgs hereditary in Hungary (1687), could make peace permanent in that long distracted country; and Leopold, who also had to wage

LEOPOLD — LEPIDOPTERA

three protracted wars against Louis XIV. In the German empire the long reign of Leopold witnessed the growing power of the house of Brandenburg under Frederick William, the great elector, whose son assumed the royal title under the name of Frederick I. in 1701.

Leopold II., emperor of Germany: b. Vienna 5 May 1747; d. there 1 March 1792. He was the 3d son of the emperor Francis I., and succeeded him in 1765 on the throne of Tuscany. The death of his brother Joseph II. in 1790 called him to the greater cares of the vast Austrian dominions and soon after of the German empire. He hastened to make terms with Frederick William II. at Reichenbach (27 July 1790), was unanimously elected German emperor, pacified Hungary by taking the royal oath to observe strictly the constitution and by various concessions, proclaimed a full amnesty and restored all their ancient privileges to the Belgians, gave Tuscany to his son Ferdinand, concluded a peace with Turkey at Sistova (4 Aug. 1791), concerted with Frederick William, Frederick Augustus of Saxony, and others, at Rilnitz, preliminary measures for meeting the aggressions of the French revolution, and finally made a formal defensive and offensive alliance with Prussia (February 1792). Of his 16 children his eldest son Francis succeeded him on the throne.

Lepanto, Battle of, a famous naval engagement fought near the town of Lepanto in Greece, on the Gulf of Corinth, 7 Oct. 1571, between the Ottoman and the combined Mediterranean fleets of the Christian allies, who under the command of Don John of Austria obtained an overwhelming victory. Cervantes (q.v.), the author of 'Don Quixote,' distinguished himself in this battle, receiving three wounds.

Lepanto-Bontoc, lä-pän'tō-bōn-tōk', Philippines, a province of Luzon formed by the union of the three sub-provinces of Lepanto, Bontoc, and Amburayan, occupying the western central part of northern Luzon; area 1,232 square miles. The province mostly is rugged and mountainous; it is thinly settled and there are no roads, communication being by trails. The only industry of importance is copper mining. Civil government was established in May 1902. Pop. 60,000, mostly Igorotes and Ifugao.

Leper. See LEPROSY.

Lepid'olite, or Lithia Mica, an important member of the mica group of minerals, as it is now one of the chief sources of the lithia salts so valuable in medicine. Its name, derived from the Greek, lepis, a scale, alludes to its usual occurrence in fine, scaly-granular masses. It rarely occurs in distinct, monoclinic crystals. It has a pearly lustre and a gray, lilac, or peach-blossom pink color. It occurs in small quantities in many parts of Europe and Asia, but by far the most important locality is in San Diego County, California, where it is now extensively mined. It is also found in Maine and Massachusetts and has been mined near Haddam, Connecticut. It is very frequently associated with pink and green gem tourmalines.

Lepidoptera (Gr. λεπίς, scale; ἥπα, wing): An order of the class *Insecta*, comprising the butterflies and moths. The name was given to the order because the wings are covered with little scales, or flattened hairs. The *Lepidoptera* undergo in their development a complete

metamorphosis, passing through the stages of the egg, larva, and pupa, before appearing as the perfect insect, or imago.

Eggs.—The eggs of the *Lepidoptera* are minute objects, though generally large enough to be seen with the naked eye. When examined under the microscope they are found to vary greatly in form according to the species. They may be spherical, hemispherical, oval, conic, cylindrical, spindle-shaped, or flattened. The eggs of the *Cochlididae*, or slug-moths, are circular, or elliptical, and greatly flattened, resembling microscopic pancakes. The egg of the common cabbage-butterfly is spindle-shaped. The eggs of both butterflies and moths are generally beautifully fluted with raised lines, or ornamented with a net-work of sculpturings arranged in geometrical patterns. They are always provided with a minute opening in the shell known as the micropyle, permitting them to be fertilized. This is located at the apex in most forms, but in the case of those eggs which are flattened the micropyle is located on the side. The female deposits the eggs upon the plant on which the caterpillars feed, or in close proximity to the food which is to nourish them, in the case of those few species which do not subsist in the larval stage upon vegetable matter.

Larvæ.—When the eggs hatch the insects appear as larvæ, or caterpillars. These undergo successive molts as they increase in size, shedding their skins from time to time until they have attained the development at which the next transformation, known as pupation, occurs. The bodies of larvæ consist normally of thirteen segments, or somites, of which the first is the head. The forms of the larvæ are very various, though in the main they are vermiform and cylindrical. The larvæ of butterflies are for the most part smooth, though in some genera they are curiously ornamented with lateral or dorsal projections, which may be spinous, club-shaped, or filamentous. The larvæ of moths are often hairy, or spinose, and in some genera of the *Lasiocampidae*, the *Cochlididae*, and the *Saturnidae*, these spines possess stinging, or poisonous properties. Lepidopterous larvæ possess three pairs of true feet located upon the three segments immediately following the head, and corresponding to the six thoracic feet which are found in the winged form of the insects. In addition to these true feet the bodies of these larvæ are supported by from two to eight pairs of abdominal prolegs, or false feet, which are fleshy and do not recur in the imago. The head is always more or less conspicuous in the larval stage, and is provided with eyes and mouth parts adapted to cutting and deglutition.

One of the most remarkable portions of the anatomy of lepidopterous larvæ are the two long glands located in the dorsal region, which secrete a milky fluid, which is vented through a nipple-shaped organ upon the lower lip known as the spinneret, and which upon exposure to the atmosphere is transformed into the substance known as silk.

Pupæ.—When the larva has attained maturity it is transformed into a pupa. Pupæ may be naked, or they may be enclosed in a structure of silk known as a cocoon. The pupæ of butterflies are usually attached by their anal extremities to twigs, the under side of rails, or stones. The attachment is effected by means of a button of silk into which the hook-like cremaster is

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thrust. In some families chrysalids are in addition held in place by a girdle of silk. The larvæ of moths usually undergo pupation in a cocoon which may be densely woven or very loosely constructed of a few strands of silk mingled with hairs from the body of the caterpillar, or loose particles of adherent earth or fragments of leaves. Many of the hawk-moths and almost all of the owl-moths undergo transformation in underground cells which the caterpillars mold for themselves in the soil before changing into pupæ. The duration of the pupal stage varies in length according to the species, or the season. Many species in temperate climates pass the winter in the pupal form. Where there are two or more generations in a season the pupal period is short for the summer broods, and the fall brood hibernates in the pupal state. The pupæ of butterflies are often ornamented with silvery or golden spots, hence the name *chrysalis* has been applied to them, the word being derived from the Greek (*χρυσός*, gold). The pupæ of moths are generally some shade of brown or black. The pupa contains the imago and in almost all cases an examination will show in the pupa the location of the various organs of the perfect insect in a rudimentary form.

The Imago.—When the period of pupation is ended the butterfly or moth breaks through the pupal shell and emerges a four-winged, six-footed insect, known as the *imago*. The females of some species of moths are apterous, or provided with wings so poorly developed that they cannot be used in flight.

Classification.—The classification of the Lepidoptera has afforded opportunity for much divergence of opinion among naturalists, but the division into two great suborders, the *Rhopalocera*, or butterflies, and the *Heterocera*, or moths, is well established in usage.

The *Rhopalocera* contains six families:

I. *Nymphalidae* ("Brush-footed Butterflies").—The front pair of legs greatly reduced in size, tarsi of the male with but one joint, of the female with five, but without claws, the pupa suspended by the cremaster. There are eight subfamilies in this group, more than 250 genera, and about 5,000 species known at the present time. Among these are some of the largest and most splendidly colored butterflies, which are known, as well as some of the smallest and most obscurely colored forms. The family is represented in all parts of the globe.

II. *Erycinidae* ("Metal-marks").—The female has the first pair of legs weakly, though perfectly developed. The coxa of the foreleg of the males is spined, and the tarsi are unjointed and without claws. There are over 60 genera and fully 1,000 species in this group. The butterflies composing it are generally small, but gaily and curiously colored. The metropolis of the family is found in the hot lands of the New World, though it is also represented in the eastern hemisphere.

III. *Lycenidae* ("Blues," "Coppers," and "Hair-streaks").—The fore legs of the male are aborted, the tarsus having but a single joint terminated by a single claw. There are over 2,000 species known. The butterflies are generally small. The upper sides of the wings are prevalently some shade of blue, bronzy green, or copper, though there are some species, especially in Africa, yellow, red, or white.

IV. *Pieridae* ("Whites," "Sulphurs," and "Orange-tips").—The six legs are well developed in both sexes and the feet have two hooks or claws at the end. There are about 1,200 species known to science. The "cabbage butterfly" and the "common sulphur" of the clover fields are fair representatives.

V. *Papilionidae* ("Swallow-tailed butterflies").—The six legs are well developed. The claws are simple. About 1,000 species belong to this family, among them some of the largest and most splendid tropical insects.

VI. *Hesperiidae* ("Skippers").—The six legs are perfect. The claws are short and thick. The bodies are relatively robust. In flight the insects are very quick and powerful, hence the common name. The butterflies are generally small, though there are some quite large species.

There are about 13,000 species of butterflies which have been named and described. It is probable that when we shall have explored the entire earth the total number of existing species may be found to be 18,000.

The *Heterocera*, or moths, may be divided into about 60 families, of which 43 are represented in North America. The families which have the largest number of species in North America are the *Noctuidæ*, or "owl-moths," the *Geometridæ*, or "measuring-worm moths," the *Saturniidae*, or "wild silk-moths," the *Arctiidae*, or "tiger-moths," the *Sphingidae*, or "hawk-moths," the *Tortricidae*, or "leaf-rollers," and the *Pyralidae*. More than 7,000 species of moths are known to occur in the United States and Canada, and probably more than 100,000 species at present exist upon the globe.

The most important of all the *Lepidoptera* from a commercial standpoint is the silk-moth (*Bombyx mori*), which was introduced into Europe from China by way of India, and at an early date was brought to the New World.

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Lepidosiren, the American genus of *Dipnoi* (q.v.) or lung-fishes, closely resembling the African genus *Protopterus*, but having a more eel-like form, smaller scales and the paired limbs reduced to mere filaments of no use in locomotion. The single species *Lepidosiren paradoxa* was discovered by the Austrian naturalist Natterer in the tributaries of the upper Amazon in 1837. For fifty years the species

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was known from only two or three museum specimens, but in 1887 was re-discovered in abundance in Paraguay by an Italian zoologist, and since then has been the object of several expeditions which have made it well known. It lives in the sluggish, vegetation-choked streams and lakes of that region, the natives of which spear it in large numbers for food. Its large eggs, more than a quarter of an inch in diameter, are deposited in underground nests where they are guarded by the males, whose ventral fins become densely villous and serve as accessory respiratory organs at this time. On the approach of the dry season the muscles of the tail undergo fatty degeneration and the fish retires to a mucus-lined "cocoon" in the mud at the bottom of a burrow sealed at intervals of 3 or 4 inches by plates of mud perforated by two or three small openings. In these retreats the "lolachs," as they are called by the Indians, remain until the rains again convert the baked earth into mud. The lepidosiren feeds on large aquatic snails, conchæ, and roots.

Lepidos'trobus (Gr. "whirling scale"), a cone from the coal measures, usually found in seams or nodules of clay-ironstone, and often compressed. They consist of a central axis surrounded by imbricated scales or bracts, each containing a sporangium (spore-case). They have been found united to the tip of the branches of *Lepidodendron*, and this shows that they were the fruit of that genus.

Lepidos'teus. See GAR.

Lep'idus, Marcus Æmilius, Roman triumvir: d. Circeii 13 B.C. He became prætor 49 B.C., consul with Julius Caesar in 46, and in 44 was appointed by Caesar to the government of Narbonese Gaul and Nearer Spain. He was in Rome at the time of Caesar's death, and joined Mark Antony. In 43 he united with Antony and Octavianus to form the triumvirate, obtaining Spain and Narbonese Gaul in the division of the empire. After the battle of Philippi (42) a re-division took place, in which Lepidus received Africa, where he remained till 36, when he was summoned by Augustus to assist him against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who deprived him of his triumvirate, and banished him to Circeii, where he lived under strict surveillance.

Lepor'idae, a family of rodents comprising the rabbits and hares (q.v.). With the *Lagomyidae* it constitutes the suborder *Duplicidentata*, distinguished from all other rodents by having two pairs of upper incisors, of which the second is much reduced in size and placed immediately behind the first or larger pair. The hind-legs are much longer than the fore-legs and are well adapted by their structure for the leaping mode of locomotion affected by these animals; the tibia and fibula are completely ankylosed and articulate with the calcaneum by a pulley-like surface, thus combining great strength with great freedom of movement in one plane. The family is now cosmopolitan, but no species is indigenous to Australia. The genus *Lepus* is practically co-extensive with the family.

Leprosy, a term very vaguely used by medical and other writers to denote a disease, *Lepra tuberculosa*, which appears to have prevailed from the earliest time down to the present. The affection is identical with the *elephantiasis* of the Greeks and the *lepra* of the Arabians, which is altogether different from the *elephantiasis* of the Arabians and the *lepra* of the Greeks. The most prominent symptoms of the disease are as follows: dusky red or livid tubercles of various sizes on the face, ears and extremities; thickened state of the skin with diminution of its sensibility; falling off of the hair, except that of the scalp; hoarse, nasal or lost voice; ozæna; ulcerations of the surface and extreme fetor. The tubercles vary in size from that of a pea to an olive. Hands, feet and face are generally first affected.

In modern times three kinds of leprosy are recognized. In the first variety the whole body becomes white and scaly, without much interference with the general health. This is the true Biblical leprosy, and it is rare nowadays. The second variety makes the victim insensible to pain in the hands and feet in its earlier stages, and later on in the arms and legs. It is known as anæsthetic leprosy. The sufferer from this form of the disease is much troubled with dysentery, and when the disease is advanced his hands and feet are liable to slough off. The third variety of leprosy is known as the tubercular form. It is distinguished by horrible swellings of loose skin, which becomes discolored. This is the commonest modern variety of the disease and the one most repulsive.

In Palestine and the countries immediately east of it leprosy existed until the dispersion of the Jews in the 1st century of the Christian Era. As the power of the Roman Empire declined in the west of Europe a strong tide of emigration from the Levant set in. The plague of leprosy spread with the teaching of Christianity until no country in Europe was free from it. Between the 6th and the 15th centuries leprosy was by far the most dangerous and infectious disease of which any account has come down to us.

To be a leper was to be an outcast beyond hope of any solace but the grave. All the larger towns in Europe had a place specially set apart for its lepers. This reservation was shunned as if it were the mouth of a burning hell. A boundary line was made, beyond which no leper could venture, except at the risk of instant death. If a healthy stranger unwittingly wandered too near the leper's camp he was remorselessly thrust into it and made to share the lot of those previously afflicted. Food was furnished to these leper camps by the town authorities. The provisions intended for the use of the lepers were left on some exposed hill, selected for that purpose, during the daytime, and removed by the inmates of the camp at night. No office, no matter how exalted, served to keep a sufferer from leprosy from universal ostracism.

In the sparsely settled country districts, solitary lepers abounded. Each one wandered about by himself in the unfrequented woods and uninhabited waste places. The rigorous compulsion of the villagers compelled him to wrap himself in a sheet so that only his eyes

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were exposed. He must carry a bell in his hand and ring it in order to warn wayfarers of his approach. Whenever the dismal tinkling of the leper's bell was heard, the inhabitants fled in terror of their lives. The unfortunate victim supported life as best he might by roots and berries, and by the occasional offerings of charitable persons left where he could find them.

At an early period in the history of the Christian Church efforts were made to alleviate the sufferings of lepers. An order of Saint Lazarus was formed as early as 72 A.D., taking its name from Lazarus, the beggar who ate the crumbs which fell from the rich man's table. Later on, in the 12th century, a military order of Lazarus was founded by the Knights Hospitallers. When these knights were driven out of Palestine they made France and afterward Sicily their headquarters. Numerous lazarettos were established by them in the principal cities of Europe. For many years the grand master of this order was required to be a leper. In civil law the leper was treated as one dead. His property passed to his heirs, his wife was free to marry again, and on his departure for the lazaretto prayers for the dead were repeated over him, and a shovelful of earth was thrown after him to make the ceremony complete.

With the progress of civilization leprosy gradually disappeared from every part of Europe except Norway. Lazarettos gradually fell into disuse, and only the name of leper remained as a by-word to express social and moral contamination. Great Britain was one of the last countries to cut clean of leprosy. As late as the 15th century, 250 leper hospitals were in existence there. The government, as well as other European governments, has practically banished the disease, by careful surveillance. In British America the disease still lingers in New Brunswick. In the hospital for lepers at Tracadie there have been a score of cases regularly for many years.

In the United States leprosy has existed since the Revolution and probably will continue to exist. Leprosy hospitals in secluded spots are maintained in San Francisco, New Orleans, and New York, and cases are always found here in numbers from two or three to a score. In the Philippines at the time of the American occupation there were 15,000 cases in the islands, but by the census of 1902, only about 5,000 cases were reported. The disease was brought to Manila originally from Japan about 200 years ago.

The most celebrated leper colony or settlement in the world is that on the island of Molokai in Hawaii; but the conditions there have been much exaggerated. Molokai lies about 25 miles from the island of Oahu, and about 56 miles from Honolulu. Its native name is Ka-ania-pali, a land of precipices. It is 40 miles long, seven miles broad, and has an area of a little more than 200,000 acres. The leper settlement on the elevated, grassy plain of Kalaupapa has an area of 8,000 acres. This plain is bounded on three sides by the ocean, and on the landward side by perpendicular cliffs. There is always a delicious blending of warmth and coolness in the air, which indisposes one for mental and physical effort and soothingly induces a condition of blissful and tranquil repose.

The whole number of lepers at the Molokai settlement in 1902, was officially reported at 1,191, viz.: 741 males and 450 females. There would be, therefore, nearly seven acres of productive soil for every member of the settlement. There are hospitals, dispensaries, churches, and comfortable cottages for the accommodation of families; these cottages are well ventilated, abundantly supplied with fresh water and kept in good condition. Cottage residents requiring medical treatment are attended at their own homes by the resident physician. Every man, woman and child may draw 21 pounds of fresh beef every week, a liberal supply of taro, flour or bread, rice, tea, sugar, salt, tobacco, and matches, and as much good clothing as required. A sum of money is paid to those who do not draw the full ration, which enables them to purchase articles not included in the regular supply.

Whether leprosy can be cured is a question. The administration of tonics and astringents has appeared to give good results. The use of iodides and mercurial preparations have also been tested, as well as the tincture of cantharides; but all of these remedies produce more or less identical effects—that of a temporary amelioration of the condition of the patient, but without well-founded hopes of anything approaching a genuine cure. A well known specialist believes in the use of camphor, in the form of a syrup, as one of the best methods of combating the disease; and his enthusiasm leads him so far as to state that he is convinced that leprosy is curable, if not allowed to pass certain limits, and that even those in the worst stages will derive marked benefits from the camphor treatment. Temporary alleviation has frequently been obtained by various methods, as, in a disease like leprosy, any remedy which tends to improve the state of the blood and the general health will, no doubt, have its temporary ameliorating effect upon the malady itself. Many years of careful study and of patient and conscientious application of all methods of treatment have satisfactorily demonstrated the incurability of the disease, and the most that can be done is to alleviate, as far as possible, the physical suffering and mental distress.

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Lepsius, lēp'sē-oos, Karl Richard, German Egyptologist: b. Naumburg 23 Dec. 1810; d. Berlin 10 July 1884. After studying philology at Leipsic, Göttingen, and Berlin, he published his first work 'De Tabulis Eugubinis' (1833) and thereupon removed to Paris. In 1835 he visited Italy and took up his residence at Rome. He subsequently went to London and projected with Bunsen a large work on ancient Egypt. He started in 1842 on the first of his two visits to Egypt. His life henceforth was that of an ardent Egyptologist, and honors were showered upon him. He was professor in the Berlin University, director of the Egyptian section of the Royal Museum, director of the Royal Institute, head of the Royal Library, etc. He was author of a large number of important works on Egyptian antiquities.

Leptocar'dii. See **ICHTHYOLOGY**.

Le'pus ("the hare"), in astronomy, one of the 48 constellations south of Orion, contain-

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ing several bright stars, among them Alpha and Beta Leporis.

Le Queux, lē kū, William, English novelist: b. London, England, 2 July 1864. He studied art in Paris and was subsequently a journalist there, but presently returned to London and in 1888 was a parliamentary reporter for the 'Globe,' and its sub-editor 1891-3. In 1900 he was appointed English consul to San Marino. Among his numerous fictions are: 'Guilty Bonds' (1890); 'Sinned Against' (1891); 'The Great War in England' (1892); 'Stolen Souls' (1894); 'Whoso Findeth a Wife' (1897); 'The Day of Temptation' (1897); 'Scribes and Pharisees' (1898); 'Wiles of the Wicked' (1900); 'In White Raiment' (1900); 'The Tickencote Treasure' (1902).

Leray, lē-rā', Francis Xavier, American Roman Catholic bishop: b. Châteaugiron, France, 1825; d. France 1887. He was educated at Rennes, but in 1843 crossed the Atlantic and settled at Baltimore. He went through the ordinary theological course under the direction of the Sulpicians and was admitted to the priesthood 1852. He was a chaplain in the Confederate service during the war and afterward returned to Vicksburg, and while the plague of 1867 raged, was always at hand to comfort and assist the sufferers. In 1873 he was consecrated to the see of Natchitoches, La., and 10 years later promoted to the archiepiscopal chair of New Orleans.

Lerdo de Tejada, Sebastian, sā-bäs'tē-än lär'dō dā tā-hä'dā, Mexican statesman: b. Jalapa, Mexico, 25 April 1825; d. New York 21 April 1889. He was educated at the College of San Ildefonso, Mexico, was admitted to the bar in 1851 and was appointed a judge of the supreme court in June 1857. He was minister of foreign affairs in 1857; member of Congress in 1861-2 and in 1862-3; and accompanied President Juarez in 1863-7, during which time he was successively minister of justice and minister of foreign affairs. He was elected chief justice of the supreme court in December 1867, and on the death of Juarez, 18 July 1872, succeeded to the presidency, and in the following November was elected to that post. In 1876 he was again candidate to succeed himself, and after a doubtful election was declared re-elected by Congress. This action resulted in a revolution and Lerdo was forced to leave the country. He lived in retirement in New York city till his death.

Lermontoff, lér'món-tōf, Mikhail Yuryevitch, Russian poet: b. Moscow 3 Oct. 1814; d. 15 July 1841. He was educated at the University of Moscow, became a hussar of the imperial guard in 1834, and in 1837 wrote his lines 'On the Death of a Poet,' in which he denounced the killing of Pushkin in so vigorous a fashion that he was sent to serve in the army of the Caucasus as an ensign. In 1838 he was pardoned and returned, but later was killed in a duel by one Martynoff, who imagined himself caricatured in Lermontoff's novel, 'A Hero of Our Time.' Lermontoff was a Byronic figure, abounding in ridicule and satire. The Russians rate him as their greatest poet after Pushkin. Had he lived longer he would probably have produced more extended and even

more valuable work. His chief poem is 'The Demon,' which has been translated into English by Stephen (1875). 'The Circassian Boy' and 'A Hero of Our Time' also exist in English renderings, the former by Conant (1875), the latter by Pulski (1854) and Nestor-Schurmann (1899).

Lernæ'a. See FISH-LICE.

Le Rossignol, lē rō-sēn-yōl, James Edward, American educator: b. Quebec, Canada, 24 Oct. 1866. He was graduated at McGill College and University, Montreal, in 1888; taught in the public schools of that city 1888-9; from 1889 to 1892 was a graduate student in Germany; in 1892-4 was professor of psychology and ethics in Ohio University; and since then has been professor of economics at the University of Denver. During 1900 he was special lecturer in economics at McGill College and University. He has written much on economical subjects, and has published 'Monopolies, Past and Present' (1901).

Leroux, Charles Marie Guillaume, shärl mä-rē gē-yōm le-roo, French painter: b. Nantes (Loire-Inférieure) 1814; d. 1895. He studied law and entered legal practice; but abandoned the bar for art, and after study with Corot, became a landscape artist. Among his canvases are: 'Souvenir de Fontainebleau'; 'Fête in Haut-Poitou'; 'The Erdre in Winter'; 'Dunes des Chênes Verts.'

Leroux, Frédéric Etienne, frā-dē-rīk ä-tē-ēn, French sculptor: b. Ecouché (Orne) 3 Aug. 1836. He studied with Jouffroy and at the Beaux-Arts, became an exhibitor at the Salon in 1863, obtained a medal of the second class at the Paris exposition of 1878, and a silver medal at that of 1889. Among his best known works are: 'Demosthenes on the Shore'; 'Joan of Arc'; 'Marchand de Violettes'; 'Bouquetière.'

Leroux, Hector, French painter: b. Verdun 27 Dec. 1829. He was a pupil of the Beaux-Arts and of Picot, in 1857 obtained by his 'Lazarus' the second Prix de Rome, traveled in Greece and Asia Minor, and became known for his reposeful and dignified scenes from the ancient life of Greece and Rome. Among his works are: 'A New Vestal' (1863); 'Funeral in the Columbarium of the House of the Cæsars' (1864); 'Messalina' (1868); 'The Burial of Themistocles' (1876); 'The Fall of Herculaneum' (1881).

Leroux, Louis Eugène, lōo-ē è-zhān, French painter: b. Paris 28 Sept. 1833. He studied with Picot, became known for his genre-scenes derived from Breton life, and painted, among his more important works: 'Le Nouveau-Né' (in the Luxembourg Gallery); 'Avant l'Ensevelissement'; 'La Prière'; and 'Avant la Confession.'

Leroux, Robert Henri, rō-bär öñ-rē (called HUGUES), French journalist and author: b. Havre 1860. He became a journalist at Paris, where he wrote for the *Temps*, *Matin*, *Figaro*, *Journal*, and other newspapers, and published two works on Russia, 'La Russie Souterraine' (1885), and 'L'Attentat Sloughine,' a story of the Nihilists. He has visited the United States as lecturer before the Cercle Français de l'Harvard. His further works in-

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clude: 'L'Autre France' (1900), a drama, with Decourcelle; the works of fiction, 'Un de Nous' (1886); 'Le Maitre de l'Heure' (1897); 'Le Fils à Papa' (1900); and the studies and sketches, 'Au Sahara' (1891), 'Portraits de Cire' (1891), 'En Yacht' (1892), 'Marins et Soldats' (1892), 'Notes sur la Norvège' (1894), and 'Nos Filles: Qu'en Ferons-Nous?' (1898).

Le Row, lē rō, Caroline Bigelow, American educator: b. New Brighton, Staten Island, N. Y., 28 Dec. 1843. She was graduated at the Boston Normal School, and took courses in physical culture, voice culture and elocution under private instruction. In 1865 she entered the profession of teaching, which she has since followed, her present position (1904) being with the Girls' High School, Brooklyn, N. Y. She has published: 'Duxberry Doings'; 'A Fortunate Failure'; 'How to Teach Reading'; 'A Practical Reader'; 'Practical Recitations'; 'Columbian Speaker'; 'English as She is Taught' (1902); 'The Young Idea' (1902).

Leroy, lē-roï, William Edgar, American naval officer: b. New York 24 March 1818; d. there 10 Dec. 1888. In 1832 he entered the navy as a midshipman and served as a lieutenant on the Princeton during the Mexican War. He served in the United States navy during the Civil War also, doing good service on several important occasions, became a commodore in 1870 and a rear-admiral in 1874. He commanded the South Atlantic squadron 1876-9 and retired from active service in 1884. On account of his courtly manners and general fastidiousness he was often styled "the Chesterfield of the Navy."

Leroy-Beaulieu, lē-rwā bō-lē-ē, Henri Jean Baptiste Anatole, French historical writer: b. Lisieux, Calvados, 1842. He is a brother of Pierre Paul Leroy-Beaulieu (q.v.). In 1881 he was appointed to the chair of modern history in the Ecole Libre des Sciences Politiques, and in 1887 was elected to the Academy of Moral and Political Sciences. He contributed extensively to the 'Revue des Deux Mondes,' and published in 1887-9 the important work, 'L'Empire des Tsars et les Russes,' a study of Russian history, politics, and civilization, based partly on direct observation. Others of his publications are: 'La France, la Russie, et l'Europe' (1888); 'La Révolution et le Libéralisme' (1890), 'Israël chez les Nations' (1893).

Leroy-Beaulieu, Pierre Paul, pē-är pōl, French economist: b. Saumur, Maine-et-Loire, 9 Dec. 1843. He was educated at the Lycée Bonaparte and the Ecole de Droit of Paris and the universities of Bonn and Berlin; became a journalist at Paris; wrote his 'De l'Etat Moral et Intellectuel des Populations' 'Ouvrières' (1868), crowned by the Academy of Moral and Political Sciences; assisted in founding the Ecole Libre des Sciences Politiques; and was appointed professor of finance there in 1872. In 1880 he became professor of political economy in the Collège de France. He established in 1873 'L'Economiste Français,' which he has continued to edit. In 1878 he was elected to the Academy of Moral and Political Sciences. Among his further writings are: 'Les Guerres Contemporaines' (1853-66; 1868-9); 'Traité de

la Science des Finances' (1877; 5th ed. 1891); and 'Précis d'Economie Politique' (1888; 3d ed. 1891).

Léry, Jean de, zhōñ dē lä-rē, French Calvinist preacher: b. La Margelle, France, 1534; d. 1601. In 1556 he was sent from Geneva to preach at Rio Janeiro, Brazil, where French colonies had been established by the Huguenots, and was the first Protestant minister to preach on the American continent. He and the preachers who accompanied him were obliged to return to France, owing to a bitter misunderstanding which arose between them and those who employed them. Léry has left an account of his travels in the west under the title 'Histoire d'un Voyage fait en la Terre du Brésil' (1578).

Lesage, Alain René, à-lāñ rē-nā lé-sāzh, French novelist and playwright: b. Sarzeau, near Vannes, 8 May 1668; d. Boulogne-sur-mer 17 Nov. 1747. He studied law in Paris and became an advocate, but soon afterward turned all his attention to literature. He made many fruitless efforts after recognition and success, principally by translating from the Greek and Spanish. At length two plays of his, 'Crispin Rival de Son Maître' (1707) (adapted from a Spanish piece of Mendoza's), and 'Tuscaré' (1708), a satire on the financiers of his day, had a genuine success. But he gained even greater praise and reputation from his comic romance, 'Le Diable Boiteux' (1707). This was indeed merely an imitation of a Spanish tale of Guevara, which he completely Galicized so as to direct its point against the Pietism which characterized the last period of Louis XIV.'s reign. But his greatest work was 'Gil Blas de Santillane' (1715). To his eternal disgrace Voltaire as well as many Spaniards jealous for their country's honor asserted that this novel was a bare-faced plagiarism from a Spanish original. In 'Gil Blas' the wit of the author is triumphant and the surprises and adventures of human life, with all the ups and downs of fortune, are made to rouse our sense of humor as well as our keenest interest, and to dazzle our fancy by the swiftness and variety of their changes. The work is, of course, destitute of high ideal and all moral aim, but it has been compared with those of Rabelais and La Fontaine, and its hero was certainly the precursor of Figaro. The most memorable of Lesage's other romances are 'Les Aventures de Guzman d'Alfarache' (1732), an imitation of a Spanish romance of Mateo Aleman, and 'Le Bachelier de Salamanque' (1736), the latter the production of his declining years, and highly valued by him. But his most numerous works were vaudevilles, and comic operas (101 in all). The Academy revenged itself on him for the graceless levity and irreverence toward the learned professions which he exhibited in his works, by refusing to elect him to their number. But they failed to check the growth of his fame. His influence was first spread in England through Smollet, and in France through Balzac. A full edition of his works was published in Paris in 1828. Consult: Claretie, 'Le Roman en France au début du XVIII. Siècle, Lesage Romancier' (1890); Barbaret, 'Lesage et le Théâtre de la Foire' (1887).

Lesbos, lēz'bōs. See MITYLENE.

LESCHETIZKY—LESLIE

Leschetizky, lĕsh-ĕ-tĕs'ki, Theodore, Austrian pianist: b. Lemberg, Austria, 1831. He received his musical education in Vienna, and after a successful concert tour in 1864 was made professor of the pianoforte at the conservatory of St. Petersburg, where he turned out many illustrious pupils. In 1878 he returned to Vienna with an ever-increasing reputation. As a pianist he is remarkable for delicacy of touch and a magic power of expression. As a composer he has published some very elaborate pieces for the piano, some songs, and an opera ('Die erste Falte') (1867). Perhaps the most famous of all his pupils is Paderewski (q.v.).

Lesghians, lĕs'gi-anz, a Tartar people professing Muradism, a form of Mohammedanism established by a native prophet about 1830. They inhabit the Eastern Caucasus, and form the chief portion of the inhabitants of western Daghestan. They were among the most stubborn of the Caucasian peoples in their resistance to the Russians.

Lesley, lĕs'li, J. Peter, American geologist: b. Philadelphia 17 Sept. 1819; d. Milton, Mass., June 1903. He was graduated at the University of Pennsylvania in 1838, for the next three years was engaged as assistant in the first geological survey of Pennsylvania. In 1844 he was graduated at the Princeton Theological Seminary and licensed as a minister. Visiting Europe, he made foot-journeys through several countries, and for a while studied at the University of Halle. From 1845 to 1848 he labored for the American Tract Society among people in the mountain districts of Pennsylvania, and then served two years as minister of a Congregational church at Milton, Mass., resigning on account of a change in his religious views. Returning to Philadelphia, he resumed his geological researches, extending his investigations throughout the coal, oil, and iron regions of this country and Canada. In 1855 he became secretary of the American Iron Association; in 1858 secretary and librarian of the American Philosophical Society; and State geologist of Pennsylvania in 1874. He was also professor of geology at the University of Pennsylvania 1872-8, and there in 1886 was appointed emeritus professor. In 1863 he went to Europe to examine the Bessemer iron-works for the Pennsylvania Railroad Company, and in 1867 was appointed by the United States Senate a commissioner to the Paris Exposition. He edited many works, published numerous scientific papers in various journals and reports, and also wrote: 'A Manual of Coal and Its Topography' (1856); 'The Iron Manufacturer's Guide' (1858); 'Man's Origin and Destiny from the Platform of Sciences'; 'Historical Sketch of Geological Explorations in Pennsylvania' (1876); and 'Paul Dreifuss, His Holiday Abroad' (1882).

Lesley, John, Scottish prelate and historian: b. Scotland 29 Sept. 1527; d. near Brussels, Belgium, 31 May 1596. He was educated at King's College, Aberdeen, and in 1554 became professor of canon law there. A firm friend of Mary, Queen of Scots, and by her appointed bishop of Ross, he was concerned in the scheme for her marriage to the Duke of Norfolk, and in the consequent rebellion in the north of England, and was imprisoned in the

Tower. While there he wrote 'Pie Consolations.' When released in 1573 he crossed to the Continent, and in 1593 became bishop of Coutances in Normandy. His chief production is a history of Scotland (1578), in 10 books, 7 in Latin and the last 3 Scottish dialect.

Leslie, Charles Robert, English painter: b. London, England, 19 Oct. 1794; d. there 5 May 1859. His parents were Americans, the father being a watchmaker of Philadelphia, and to that city they returned with the boy in 1800. There he attended school, and was afterward apprenticed to a bookseller; in 1811 went to England and studied with Allston, West, and others; was elected associate of the Royal Academy in 1821, and in 1826 to full membership. He first adopted a style in large historical subjects, but his genius led him into historical genre of a humorous character, in which he excelled alike in conception and execution, and in which his gentle humor was as pervasive as his finished manner. He was first brought into wide notice by his 'Sir Roger de Coverley Going to Church' (1819). To this period belong his portrait of Washington Irving and the illustrations which he designed for that author's 'Sketch-Book' and his 'Knickerbocker's History of New York.' Leslie's election as an associate of the Academy was secured by 'May-day Revels in the Time of Queen Elizabeth.' In 1824 he visited Sir Walter Scott at Abbotsford and painted his portrait. He was elected professor of drawing at the United States Military Academy, West Point, in 1833, accepted the position, but in a few months gave it up and returned to England. In 1838, at Windsor, he painted 'The Queen Receiving the Sacrament after the Coronation.' From 1848 to 1852 he was professor of painting at the Royal Academy. His principal pictures illustrate scenes from the works of great authors, among his strongest traits delicate perception of character and of womanly beauty being observable. His best known paintings include: 'Sancho Panza in the Apartments of the Duchess' (1828); 'Uncle Toby and the Widow Wadman' (1831); 'The Taming of the Shrew' (1832); and 'The Dinner at Mr. Page's House' (1838). He published a volume of lectures as a 'Handbook for Young Painters' (1855); 'The Memoirs of Constable' (1865); an unfinished 'Life of Reynolds' (1865); and 'Autobiographical Recollections' (1860).

Leslie, Eliza, American author: b. Philadelphia 18 Nov. 1787; d. Gloucester, N. J., 1858. Her girlhood was spent partly in London, England, where her brother, Charles Leslie (q.v.), afterward became distinguished as an English artist. She returned to the United States in 1799, and the rest of her life was nearly all passed in her native city. She first became famous by her 'Seventy-five Receipts for Pastry, etc.' (1827), followed by 'The Domestic Cookery Book' (1837), 40,000 copies of which were sold; 'The Home Book' (1840); and 'The Ladies' Receipt Book' (1846). She had, however, soon after the success of her first work, begun to write juvenile and other works, and for a generation was one of the most popular of American prose writers. Her books are mainly, though not invariably, written to enforce moral instruction, and among them are: 'The American Girls' Book' (1831); 'Stories for Helen';

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‘Kitty’s Relations’; ‘Leonilla Lynmore’; ‘The Maid of Canal Street’; ‘The Dennings and their Beaux’ (1851); ‘Mrs. Washington Potts’; and ‘The Behavior Book’ (1853). She edited for many years ‘The Gift,’ a popular annual for young women.

Leslie, Frank (assumed name of Henry Carter), American publisher and journalist: b. Ipswich, England, 1821; d. New York 10 Jan. 1880. He was educated at Ipswich; entered a mercantile house at 17; developed artistic abilities, and under the name of Frank Leslie contributed sketches to the ‘Illustrated London News.’ The success of these led to his giving up commercial pursuits to become superintendent of engraving for that paper. In this position he produced valuable inventions, and made himself master of technicalities. Coming to the United States in 1848, he followed his profession here, and in 1854 founded the ‘Gazette of Fashion’ and the ‘New York Journal.’ In 1855 he began the publication of ‘Frank Leslie’s Illustrated Newspaper’ (now ‘Leslie’s Weekly’), following these with the ‘Chimney Corner,’ the ‘Boys’ and Girls’ Weekly,’ the ‘Budget of Fun,’ and others. In 1867 he was appointed commissioner to the Paris Exposition, where he received a prize for his services to art. He married Miriam Florence Folline, of Louisiana, and she, having taken at his death, by legislative act, the name of Frank Leslie, successfully continued the business, from which she finally withdrew in 1900.

Les Misérables, là mē-zā-rā-bl, a novel by Victor Hugo (q.v.), giving a comprehensive view of Parisian life, chiefly among the lower orders, during the 19th century. It was published 3 April 1860, having been translated previously into nine languages. It has been translated since into 12 other languages.

L’Espinasse, Julie Jeanne Éléonore de, zhü-lé zhan él-ä-ö-nör là-pi-nas, French letter writer: b. Lyons November 1732; d. Paris 22 May 1776. She was an illegitimate daughter of Madame D’Albon, and on the death of her mother she went to live with the Marquise De Vichy, the legitimate daughter of Madame D’Albon, and in 1754 became the companion of Madame Du Deffand (who had already become blind), at the urgent request of the latter. This position she occupied for about 10 years; but the jealousy and selfishness of Madame Du Deffand rendered her situation very uncomfortable. She gained the friendship of all the élite of Madame Du Deffand’s society, such as Marmontel, D’Alembert, and Turgot; and when the separation between the two ladies at last occurred her friends all adhered to her. Her earliest letters are addressed to a Spanish Marquis, Gonsalvo de More, and the later ones to Count de Guibert, a mediocre poet and essayist. They are infused with passionate devotion and were published by the widow of Guibert in 1800, and appeared in English in Boston in 1903. Consult: Asse, ‘Mlle. de Lespinasse et Mme. du Deffand’ (1877).

Lesquereux, là-kē-ré, Leo, Swiss-American palæontologist: b. Fleurier, Neuchâtel, Switzerland, 18 Nov. 1806; d. Columbus, Ohio, 25 Oct. 1889. He was educated at the Academy of Neuchâtel, at Weimar, and at the University

of Berlin; was principal of the College of Chaux-de-Fonds (Switzerland) in 1829-34; made a special study of peat; and was appointed by the Neuchâtel authorities to examine the peat bogs of that canton. In 1844 he received from the Neuchâtel government a gold medal for his treatise, ‘Directions for the Exploration of Peat Bogs.’ In 1848 he came to the United States; was for a short time assistant to Louis Agassiz at Cambridge; and later became assistant to W. S. Sullivan (q.v.), in the study of American bryology, at Columbus, Ohio, where he resided until his death. He made particular investigation of the coal formations of the United States, more especially of the Pennsylvania coal flora, and he became the chief American authority on fossil botany. He published with Sullivan: ‘Muscum Americanum Exsiccatum’ (1856; 2d ed. 1865), and ‘Icones Muscarum’ (1864); and with T. P. James ‘Manual of the Mosses of North America’ (1884). He also contributed (1880-4) three volumes on the coal flora to the Pennsylvania geological survey, which has been considered one of the chief American works on carboniferous plants; and three reports to the volumes published by the Hayden survey. He wrote more than 50 memoirs on scientific subjects. In 1864 he became a member of the National Academy of Sciences, and in 1888 of the Geological Society of London.

Lesseps, lē-sēps (Fr. lē-séps), Ferdinand, VICOMTE DE, French diplomat: b. Versailles 19 Nov. 1805; d. 7 Dec. 1894. He entered the diplomatic service in 1828, and after being consul at various places was ambassador to Madrid in 1848-9. In 1854 he went to Egypt at the invitation of the viceroy, Said Pasha; there sketched a plan for canalizing the Isthmus of Suez, and in 1856 published a report on the subject. This great work was at last begun in 1859, and was carried to completion under his supervision in 1869. (See SUEZ CANAL.) He also planned the unfortunate Panama Canal (q.v.), and after the company was dissolved in 1889, judicial proceedings were taken against Lesseps and other directors for maladministration of funds and bribery, and he was condemned to imprisonment. He was elected to the Academy of Sciences in 1875, and to the Académie Française in 1884. Among his writings are: ‘Mémoire à l’Académie des Sciences sur le Nil Blanc et le Soudan’; ‘Principaux Faits de l’Histoire d’Abyssinie’; ‘Lettres, Journal et Documents relatifs à l’Histoire du Canal de Suez’ (1875-81), crowned by the Academy; ‘Souvenirs de Quarante Ans’ (1887); and ‘Origines du Canal de Suez’ (1890). Consult biographies by Bertrand and Ferrier (1887) and by Smith (2d ed. 1895).

Les’sing, Gotthold Ephraim, German dramatist and critic: b. Kamenz, Upper Lusatia, Saxony, 22 Jan. 1729; d. Brunswick 15 Feb. 1781. He was a diligent student, who, according to his tutor, was a horse that needed double fodder. He went to Leipsic ostensibly for a theological training; but he gave his chief attention to general literature, and contributed some interesting articles to literary journals. His academic studies having been concluded at Wittenberg, he went to Berlin, where he was active as journalist and critic, and whether he returned (1758) after a two-years’ sojourn at Leipsic. In 1760 he became secretary to Gen-

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eral von Tautentzien, governor of Breslau; and in that post continued for more than four years. His independence and fine sincerity led him to reject several opportunities of material advancement; as when he refused the chair of eloquence at Königsberg, because the tenure of it involved an annual eulogy of the king. In 1767 he became critic and director of the theatre at Hamburg which an association of wealthy merchants purposed establishing for the promotion of the national drama. The scheme shortly failed, and from 1770 until his death Lessing was librarian to the Duke of Brunswick at Wolfenbüttel, where he was valued only for the prestige he lent the little state. Lessing was the one who reformed German literature and set it on the way of national growth and progress. He became the foremost German writer of his time, and one of the more remarkable writers of all time, through his 'Minna von Barnhelm' (1767), the first national drama of Germany, and 'Laokoon' (1766), the best work of German criticism. 'Minna von Barnhelm' was an artistic presentation of contemporaneous life, and liberated the German drama from the slavish imitation of the French so exclusively preached by Gottsched. In it Lessing wished to rebuke not only the disposition toward aping the French, but also the indifference of the rulers, to the soldiers that had won the Seven Years' war; and to eliminate the provincial hate which then so often existed in Germany, especially that between Prussia and Saxony. In 'Laokoon' Lessing appears as one of the greatest of critics. His eagerness for truth is remarkable; his revelation of hypocrisies and falsehoods, fearless. His chief argument is that for the establishment of a clear distinction between the plastic arts and poetry, the basic difference being determined to be that while art presents objects in space, poetry presents actions in time. Not all its contentions may be admitted; but Herder, who published a criticism in disagreement with many of its points, yet read it through three times in an afternoon and following evening, and praised it in high terms. Macaulay said it made him wonder and despair; and Goethe, who was greatly indebted to its teachings, declared that by it "all previous criticism was thrown away like an outworn coat." His 'Nathan der Weise' (1772; in a good English rendering by E. Frothingham 1868) is the most celebrated of his dramas, and indeed perhaps the most generally familiar of all his writings. It was his ultimate answer to the theological controversialists who had begun their attacks with the publication by Lessing of an edition of portions of a manuscript work, obtained by him while in the ducal library, on the origins of Christianity and written by one Samuel Reimarus. To these 'Wolfenbüttler Fragmente' (1774-8) Pastor Goeze of Hamburg made the chief objection, and to Goeze Lessing gave his most elaborate rejoinders, such as 'Eine Parabel,' 'Axiomata,' and 'Anti-Goeze.' He does not defend Reimarus, but he does defend free inquiry, and opens up the field for later Biblical criticism and the study of the growth of Christian institutions. Lessing having been directed by the Brunswick government to discontinue the controversy, made a poetic statement of his views in 'Nathan der Weise,' a remarkable plea for religious tolerance, and a declaration that true religion is one of charac-

ter, not formula. The work has been criticised from the strictly dramatic viewpoint, but as a dramatic poem has been called one of the finest works of the 18th century. Others of Lessing's works are 'Emilia Galotti' (1772), a skilful tragedy; 'Briefe die Neueste Litteratur Betreffend' (1758), with Nicolai, which first directed German thought to the study of Shakespeare; 'Ueber das Wesen der Fabel' (1760); and the 'Hamburgische Dramaturgie,' dramatic reviews. "Lessing," said Goethe, "wished to disclaim for himself the title of poet, but his immortal works testify against himself." His battle against error in all domains had notable effect in Germany, and has not yet failed of an even wider stimulative interest. A collected edition of his works, prepared by various scholars, appeared in 1868-77. Consult the biographies by Sime (1877) and Zimmern (1878) in English, and by Stahr (1859) and Duntzer (1882) in German. See GERMAN LITERATURE.

Lessing, Karl Friedrich, kär'l frē'd'rīh, German painter, grand-nephew of G. E. Lessing (q.v.): b. Wartenberg, Silesia, 15 Feb. 1808; d. Karlsruhe, Baden, 4 June 1880. He was sent about 1822 to the architectural school of Berlin, to fit himself for an architect. After a severe struggle between duty and inclination, he yielded to his artistic inclinations and by the production of his 'Churchyard with Gravestones and Ruins' (1825) fixed his profession irrevocably. This picture produced a strong impression, and for a year or two the artist devoted himself to landscape; but coming under the influence of Schadow, established himself in Düsseldorf, and studied historical painting with enthusiasm and success. 'The Court Yard of the Convent—a Snow Scene,' is perhaps the most striking of all his landscapes. 'The Tyrant Ezzelin in Captivity refusing the Exhortations of the Monks' (1838), was his first important historical picture in the new style. It was followed by 'Huss before the Council of Constance' (1842), the 'Seizure of Pope Pascal II.,' the 'Martyrdom of Huss' (1850), now in New York, and many others, under the influence of which the school of Düsseldorf divested itself of the strictly Catholic spirit by which it was previously characterized, and adopted a bolder and more dramatic manner, and a greater freedom in the choice of subjects. Lessing, however, is distinguished from his associates by depth of thought, energy of expression, and vivid dramatic conception, at the same time that his pictures exhibit the hardness of outline and defective coloring peculiar to the Düsseldorf school. Consult Jordan, 'Ausstellung der Werke Karl Friedrich Lessings' (1880).

Lesson. See LECTORY.

Les'ter, Charles Edwards, American author: b. Griswold, Conn., 15 July 1815; d. Detroit, Mich., 29 Jan. 1890. He studied law in Mississippi, and was admitted to the bar, but afterward spent two years at the Auburn Theological Seminary, and was duly ordained. The pulpit, however, proved not more congenial to his tastes than the bar, and he employed his time chiefly with the pen. He was appointed United States consul at Genoa, 1842-7, and was afterward prominent as a journalist and political speaker. He published 'Glory and Shame of England' (1841); 'Condition and Fate of England' (1842); 'The Artist, Merchant, and

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Statesman (1846); 'Life and Voyages of Americus Vespuccius' (1846); 'Artists of America' (1846); 'My Consulship' (1851); 'Our First Hundred Years' (1874-5); and translations of Alfieri's 'Autobiography' (1845); Massimo d'Azeglio's 'Challenge of Barletta' (1845), and Macchiavelli's 'Florentine Histories' (1846).

Lester, John Henry, American inventor: b. Montville, Conn., 27 Sept. 1815; d. Brooklyn, N. Y., 10 Jan. 1900. He was one of the earliest sewing-machine makers in the United States, and besides inventing a lock-stitch sewing-machine, he devised a wood-planing machine, and other labor-saving machines. In 1859-60 he established a wood-planing manufactory in Richmond, Va., and when the Civil War broke out was ordered by the Confederate government to alter arms for its army. Lester, being loyal to the North, withdrew from the firm and went to Washington, D. C., where he had an interview with President Lincoln. Nevertheless, his loyalty was suspected and he was sentenced to ten years' imprisonment by a military commission, but was freed after 20 months' confinement.

Lestocq, lës-tök, Jean Hermann, French physician and adventurer: b. Celle, Hanover, 29 April 1692; d. Livonia 12 June 1767. He was the son of a French Protestant surgeon who had left his native country on the revocation of the edict of Nantes, and when 21 went to Russia to seek his fortune. He was first employed by Peter the Great, but on account of his dissolute morals, was exiled to Kasan in 1718. Catharine I., on her accession in 1725, recalled him, and appointed him physician in the household of her second daughter Elizabeth. He soon gained an influence over the mind of this princess, and when the imperial title devolved upon Ivan VI., he persuaded her that the only way of saving her own life was to seize upon the crown. She yielded to his suggestions, made the young czar prisoner, and seated herself on his throne. Lestocq was then appointed privy councillor, which gave him the rank of general, physician in ordinary to her majesty, and president of the medical college. His prosperity lasted but a few years. Charged with treasonable projects, he was arrested, tortured, and exiled to Siberia. Peter III., on his accession, gave orders for his recall, and Catharine II. gave him an estate in Livonia.

Les'todon, a genus of fossil animals of Patagonia, allied to *Mylodon*, and distinguished by the possession of canine teeth. See GROUND-SLOTH.

Lestrangle, lës-tränj, Sir Roger, English journalist and pamphleteer: b. Hunstanton, Norfolk, 17 Dec. 1616; d. London 11 Dec. 1704. He was probably educated at Cambridge. In 1629 he accompanied Charles I. in his expedition against Scotland. In 1644 he formed a plan for surprising Lynn Regis, but was seized and condemned as a spy. He was, however, respited from time to time until he had been in prison four years, when he escaped to the Continent. In 1653 he returned to England, was licenser of the press from the Restoration until the close of the reign of James II., and edited the 'Public Intelligencer' in 1663, the London 'Gazette' in 1665, and the 'Observator' in 1681, the latter existing till 1687. He was author of a great number of coarse and virulent

political pamphlets, and translated Josephus, Cicero's 'Offices,' Seneca's 'Morals,' Quevedo's 'Visions,' and other works of ancient and modern writers.

Lesueur, Eustache, ès-täsh lë-sü-ér, French painter: b. Paris 19 Nov. 1617; d. there 30 April 1655. He was taught drawing by his father, a sculptor, and was afterward placed at the school of Vouet, where the Italian masters became his models. His masterpiece is the series of paintings executed for the Carthusian monastery in Paris in 1645-8. These pictures are now in the Louvre, and in twenty-two panels depict the principal scenes in the life of St. Bruno. In 1650 he painted for the corporation of goldsmiths the 'Preaching of the Apostle Paul at Ephesus,' which was presented to the chapter of Notre-Dame, but has been now removed to the Louvre. He did much in decorating the old parish churches of Paris and among his later productions are some mythological scenes in the Hotel Lambert. His works are distinguished by purity of line, careful execution and are conceived in a mood of profound feeling.

Le Sueur, Jean François, zhôñ frâñ-swâ, French composer: b. Drucat-Plessiel, near Abbeville, 15 Jan. 1760; d. Paris 6 Oct. 1837. At six he was placed at the musical school of the cathedral of Amiens, and after completing his studies was made director of music in the cathedrals at Séez, Dijon, etc., and in 1784 in the Church of the Innocents, Paris. In 1786 he became master in the Church of Notre Dame. He was afterward induced to compose for the theatre, 'Telemachus,' his first opera, being given with great success in the Théâtre Feydeau. From 1788 he devoted his time altogether to theatrical music. His opera 'La Caverne' was produced in 1793; 'Paul et Virginie' in 1794; 'Télémaque' in 1796; 'Les bardes' in 1804; and 'La Mort d'Adam' in 1809. He was made professor of music in the National Institute. In 1813 he became a member of the fourth class of the Institute; in 1814 composer to the king; and in 1817 professor of composition to the Conservatoire. His sacred music consists of 33 masses, and of oratorios and motets. He also wrote several works on musical subjects.

Letcher, John, American politician: b. Lexington, Va., 29 March 1813; d. there 26 Jan. 1884. He entered the practice of law in 1839, in 1850 was a member of the State constitutional convention of Virginia, and was a member of Congress in the immediate ante-bellum days. In 1859 he was elected to the governorship of Virginia. Though opposed to secession, he yielded to public opinion, and delivered the State troops and munitions to the uses of the Confederacy.

Letch'worth, William Pryor, American writer and philanthropist: b. Brownville, N. Y., 26 May 1823. From 1848 to 1869 he was a manufacturer and merchant in Buffalo, and retired from business to devote himself to benevolent work. In 1873 he became a member of the State Board of Charities, was its vice-president and for ten years its president, resigning from the board in 1890. In 1883 he was president of the National Conference of Charities, and in 1900 president of the first New York State Conference of Charities and Correction. In 1893 the University of New York conferred on him the degree of LL.D. "for distinguished services to

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the State." He secured the passage of the New York law for removal of children from almshouses, etc., and has done much for the insane, for epileptics, and for other unfortunate classes. He has published: "The Insane in Foreign Countries" (1889); "Care and Treatment of Epileptics" (1900); and numerous papers and reports on subjects connected with social science.

Lethargy, lēth'är-jī, an unnatural tendency to sleep, closely connected with languor and debility, and much resembling apoplexy in character. When awakened the person answers, but, ignorant or forgetful of what he said, immediately sinks into the same state of sleep. It may arise from a plethoric habit, from deficient circulation in the brain, or from nervous exhaustion of that organ. A poisoned state of the blood, or a suppression of urine, may induce the lethargic state. When it is the consequence of alcoholic intoxication, or of the action of narcotic drugs, it should be treated as for these conditions.

Lethbridge, Sir Roper, English statesman, scholar, and author: b. Devonshire 23 Dec. 1840. He was for many years prominent in educational and political movements in India, as professor in the Bengal educational department, and subsequently as political agent and press commissioner. He was a member of Parliament in 1885-6. Among his works are: "A Short Manual of the History of India" (1881); "High Education in India"; "A History and Geography of Bengal"; "The Golden Book of India"; etc. In 1890 he was created Knight Commander of the Indian Empire.

Lethe, lē-thē (Greek, *Lethe*, forgetfulness), the mythological River of Oblivion in the lower regions. The water had the power of making those who drank it forget their former existence. Souls before passing into the Elysian fields drank that they might have no recollection of their earthly sorrows; those who were destined to return to the upper world in new bodies, that they might forget the pleasures enjoyed in Elysium.

Letter of Credit. See CREDIT, LETTER OF.

Letter of Marque. See MARQUE, LETTER OF.

Lettering, the art of designing the letters of the alphabet for various commercial, mechanical, and artistic purposes, largely used in architectural work, sign painting, advertisement designing, engraving, printing and book plate and book-cover making. It may be said that practically all the lettering now used in architectural offices in this country is derived, however remotely it may seem in some cases, from the old Roman capitals as developed and defined during the period of the Italian Renaissance. Composition in lettering is almost too intangible to define by any rule. All the suggestions that may be given are of necessity laid out on merely mathematical formulæ, and as such are incapable of equaling the result that may be obtained by spacing and producing the effect solely from artistic experience and intuition. The final result should always be judged by its effect upon the eye, which must be trained until it is susceptible to the slightest deviation from the perfect whole. It is more difficult to define what good composition is in lettering than in painting or any other of the more generally accepted arts, and it resolves itself back to the same problem.

The eye must be trained by constant study of good and pleasing forms and proportions, until it appreciates instinctively almost intangible mistakes in spacing and arrangement. This point of "composition" is so important that a legend of most beautiful individual letter forms, badly placed, will not produce as pleasing an effect as an arrangement of more awkward letters when their composition is good.



Classic Roman Alphabet. From Marble Inscriptions in the Roman Forum.

Lettern. See LECTERN.

Letters, papers of correspondence between friends or those who are commercially or otherwise connected. The first letters of any importance which belong to literature are those of Cicero, in which are described not only his relations with the literary men of his age, his domestic sentiments and the memoranda of his own doings, but also the great political movements of his day. These letters are the most valuable documents extant in relation to the civil war, by which Roman republicanism was abolished and Roman imperialism inaugurated. Nothing can over-estimate their value unless we come to consider the letters of Pliny. The letters of Pliny illustrate the age of Trajan and are principally remarkable as introducing us to the growing power of Christianity in the Roman empire. At the same time they give us the most complete description of the Roman house that is found in Latin literature. The description of the mansion, grounds and garden of the wealthy Romans which this writer gives us is unexampled elsewhere. Passing from the letters of the ancient Romans we come to those of a later age, and we have the letters of Basil, Jerome and other Christian fathers. Among important relics of literature must be reckoned the letters of those who belong to the great period of the Renaissance. Memorable also are the letters of Erasmus, full of wit and humor, for in them the religiousness of the

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divine is blended with the genial epigram of the man of letters. The correspondence of great men is always one of those sources of historic information whose importance cannot be overestimated. In looking over the whole field of European literature we find no more illuminating or refreshing fountain of information than in the letters of great men and women. Among these may be mentioned the letters of Madame de Sevigny, the letters of Lord Chesterfield, of Pope, Cowper, those of Gray, Shelley, Keats and Byron, and in our own time those of Fitzgerald. It has been said that the art of letter writing is a lost art, but so long as we have such beautiful and suggestive examples of epistolary correspondence as are contained in the writings of Robert Louis Stevenson and Fitzgerald it is absurd to say that the art of letter writing is one of the forgotten arts.

Letters of Junius. See JUNIUS.

Letters Patent. See PATENTS.

Letters, Proportionate Use of. Among printers experience has taught the frequency of use of letters, so that the following tables have been compiled:

A	728	N	670
B	120	O	672
C	280	P	168
D	392	Q	50
E	1000	R	528
F	236	S	680
G	168	T	770
H	540	U	296
I	704	V	158
J	55	W	190
K	88	X	46
L	360	Y	184
M	272	Z	22

The following table shows the frequency of use of initial letters:

A	574	N	153
B	403	O	206
C	937	P	804
D	505	Q	58
E	340	R	291
F	388	S	1194
G	266	T	571
H	308	U	228
I	377	V	172
J	69	W	282
K	47	X	4
L	298	Y	23
M	430	Z	18

Lettres de Cachet, lët-r-dë-kä-shä, in France, a name given to the warrants of imprisonment issued by the kings before the Revolution. All royal letters (*lettres royaux*) were either *lettres patentes* or *lettres de cachet*. The former were open, signed by the king, and countersigned by a minister, and had the great seal of state appended. Of this kind were all ordinances, grants of privilege, etc. But these checks on arbitrary power did not exist with regard to *lettres de cachet*, also called *lettres closes*, or sealed letters, which were folded up and sealed with the king's little seal (*cachet*), and by which the royal pleasure was made known to individuals or to corporations and the administration of justice was often interfered with. It was not always for political reasons that *lettres de cachet* were obtained; sometimes private persons got troublesome members of their families brought to reason in this way. The lieutenant-general of the police kept forms of *lettres de cachet* ready, in which it was only necessary to insert the name of the individual to be arrested.

Letts, lëts, a Slavonic people closely akin to the Lithuanians, inhabiting a portion of Russia. Their language, along with the Lithuanian and Old Prussian (extinct), forms the Lettic or Lithuanian branch of the Indo-European family of tongues. The Letts number about 1,000,000.

Lettuce, lët'is, a genus (*Lactuca*) of hardy annual and perennial herbs of the order Composite. Less than ten of the one hundred recognized species, which are distributed mainly in the northern hemisphere, are in cultivation, and some botanists consider these to be merely forms of three or perhaps two species. They are characterized by opposite leaves of various forms, and white, yellow or blue flowers in heads which are arranged in small panicles. The only species used in America, the common garden lettuce (*L. sativa*) is an annual whose natural prototype is unknown, but is supposed to be *L. scariola*, an Asiatic species.

Lettuce is one of the oldest food-plants, having been used, it is said, by Persian royalty more than 2,000 years ago. To-day it is unquestionably the most widely used of all our salads, and has developed an innumerable host of varieties of great diversity of form. They are somewhat roughly divided into two general groups: heading, in which the leaves form a cabbage-like head; and cutting, in which the leaves are more loosely arranged. In each of these groups are forcing and out-door varieties. A third group, the cos or romaine varieties, which may be considered a subdivision of the cabbage group, consists of long, narrow-headed kinds, whose outer leaves must be tied above the head to properly blanch the inner ones. They are specially valued as summer lettuces, because of their ability to produce leaves of good flavor in spite of considerable heat.

Lettuce succeeds best in cool weather. It requires a rich open soil and clean cultivation; plenty of sunlight in the cool seasons and partial shade in the warm. The seed may be sowed in a hotbed where the plants may be either allowed to develop, or from which they may be transplanted to the garden, eight to twelve inches being allowed between them. Immense quantities of lettuce are forced in greenhouses during the winter, and from the trucking regions of the South, where the plants are grown with only sun heat in canvas-covered beds, the markets are supplied during the winter with thousands of carloads.

When grown under glass lettuce is sometimes attacked by so-called plant diseases—leaf-spot, rust, mildew, and drop or rot. These may be very largely if not wholly controlled by good management, especially with respect to ventilation, the temperature being kept lower than that which is favorable to the growth of the fungi. Sterilizing the soil with live steam at a temperature of about 200° F. for an hour or more is practised and believed by many large growers to destroy the spores. The operation is performed a day or so before planting.

Leucadia, lëf-kä-dë'ä, or **Leukas.** See SANTA MAURA and CAPE DUCATO.

Leucæmia, a disease of unknown origin, characterized by certain changes in the blood, with enlargement of the spleen and lymphatic glands. The disease may come on rapidly, with anæmia and loss of flesh and strength; usually the onset is insidious, the deterioration of the

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general health or the swelling of the spleen or glands being first noticed. The changes in the blood consist in a decrease of the number of the red cells, diminution of the amount of haemoglobin in each cell, and great increase in the number of the leucocytes or lymphocytes. The most common form is that showing enlargement of the spleen and glands and peculiar changes in the bone-marrow; next in frequency is the form in which only the spleen and marrow are changed; and the form in which the glands alone are changed (the lymphatic) is considerably less common. Besides the increase in the number of the leucocytes, a form of the cell only found in the bone-marrow appears in the blood. The symptoms are due to the loss of nutrition of the tissues, to the anaemia, to the pressure of the enlarged spleen on the vital structures in the abdomen, and to the pressure of the enlarged glands. The glands most commonly enlarged are the chains along the neck, those in the axilla, the abdominal glands, the glands of the groin, and those of the thorax. They may be barely large enough to be felt or may form bunches in these parts that are plainly visible. Hemorrhages into the skin, eye, or internal organs may occur. The disease progresses for months or years with intervals of considerable improvement. No treatment can cure the disease, but benefit may be obtained from arsenic in large doses.

Leucin (Greek, "white"), a white substance, resembling cholesterol, first discovered by Proust in putrefying cheese, and afterward shown by Braconnot to be formed (together with other products) by the action of sulphuric acid upon animal matters. It is best prepared by the prolonged boiling of horn shavings in sulphuric acid, neutralizing with lime, precipitating excess of lime with oxalic acid, and then evaporating to crystallization. Leucin and tyrosin are thrown down together, but they may be separated by re-dissolving in water, and recrystallizing, the tyrosin then coming down first. Leucin has the chemical formula $C_6H_{10}O_4 \cdot NH_2$, and is known to the chemist as "amido-hexoic acid." (See AMIDE and HEXOIC ACID.) It may be sublimed, but if it be heated to 338° F. it melts, becoming simultaneously converted into amylamine, carbon dioxid, and ammonia. It is insoluble in ether, but soluble to some extent both in water and in alcohol. Leucin is said to occur in healthy calf's liver, and in certain other healthy tissues, such as the brain of the ox. It occurs also in certain of the products eliminated by the human skin, but its presence in the urine or in any of the internal organs of man is regarded as indicative of a serious pathological condition. Thus leucin is found in the liver in phosphorus poisoning and in acute yellow atrophy, and also in typhus fever and small-pox. In the healthy body leucin and tyrosin are probably converted into urea, and eliminated as such.

Leucippus, lü-sip'üs, Greek philosopher, flourished between the 4th and 5th centuries B.C. To him is attributed the first idea of the atomic system afterward perfected by his disciple Democritus. Kepler and Descartes were much indebted to the doctrines of these masters for the explanation of the planetary vortices.

Leucite, a native silicate of aluminum and potassium, having the formula $KAl(SiO_4)_2$, and

crystallizing in forms that are isometric at 900° F., but pseudo-isometric at ordinary temperatures. Its anomalous double refraction has been the subject of much study and discussion. The mineral is white or gray in color, and has a hardness of from 5.5 to 6, and a specific gravity of 2.50. It occurs more particularly in recent volcanic rocks, and Vesuvius is the best known locality for it. It is also found in considerable quantity in the Green River basin, Wyoming. Leucite may be converted into the mineral analcite by the action of a soda solution, and the inverse transformation of analcite into leucite is also possible.

Leucocytes. See BLOOD.

Leucomains. See METABOLISM.

Leuthen, loi'tén, or Lissa, Prussia, a village nine miles west of Breslau, which gives its name to the battle gained here by Frederick the Great, 5 Dec. 1757, over Prince Charles of Lorraine. The Austrians numbered about 90,000, and the Prussians 34,000. The Austrians lost 10,000 in killed and wounded, 12,000 were taken prisoners, besides considerable war munitions, and Silesia was regained. See SEVEN YEARS' WAR.

Leutze, loit'sé, Emanuel, American artist: b. Gmund, Würtemberg, 24 May 1816; d. Washington, D. C., 18 July 1868. He was brought to the United States in infancy and early displayed a talent for portrait painting. He studied at Düsseldorf under Lessing and lived abroad for many years after 1841. Among his works, which are largely historical, are: 'Columbus before the Council of Salamanca'; 'Columbus in Chains'; 'Columbus before the Queen'; 'Landing of the Norsemen in America'; 'Washington Crossing the Delaware,' perhaps his best known work; 'Washington at Princeton'; 'Lafayette in Prison at Olmütz Visited by his Relatives.' In 1860 he was employed by the United States government to make a large mural painting entitled 'Westward the Star of Empire takes its Way' on one of the staircases in the National Capitol.

Levant, le-vänt' ("sunrise," "orient"), in geology, a term applied by Henry Rogers to the fourth series of the Appalachian Palæozoic strata, called in New York the Medina group, and of equivalent age to the May Hill Sandstone or Upper Llandover of England. The name is given to signify metaphorically the sunrise period of the Palæozoic day. Its maximum thickness is above 2,000 feet, and most mountains of the Appalachian series are outcroppings of the Levant. There are few organic remains, chiefly marine shells and fucoids.

Geographically the word is a name applied to designate the coast of the Mediterranean immediately east of Italy, including the islands of the Ægean, Egypt, Asia Minor, and Syria.

Levasseur, Pierre Emile, pē-är ā-mél lé-vä-sér, French political economist and geographer: b. Paris 8 Dec. 1828. He was educated at the Collège Bourbon and the Ecole Normale, and after holding several important educational posts became in 1876 professor of geography at the Ecole Libre des Sciences in Paris. He has been especially prominent in regard to geographical study in French school and in addition to a series of geographies is author of

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‘Public Moneys among the Romans’ (1845); ‘The Gold Question’ (1858); ‘The Laboring Classes of France from Caesar’s Time to the Revolution’ (1859); the same continued to 1867 (2 vols.); ‘The French Population’ (1889–91), an important work; ‘France and her Colonies.’

Levee, lē-vē’ or lēvē’ (from the French word *lever*, to rise, and the time of rising). (1) In social usage, levee is a word used in high life or court language for the ceremonial visits which great personages receive in the morning, as it were at their rising. The levee is distinguished from the drawing-room, inasmuch as at the levee of a gentleman, gentlemen only appear, and at the levee of a lady, only ladies, while at the drawing-room, ladies and gentlemen both are admitted. The meaning is now more extended, and the term is applied chiefly to the stated occasions on which the king or queen of Great Britain publicly receives those subjects whom their rank entitles to the honor. On the first presentation of daughters of dukes, marquises, and earls, it is customary for the queen to kiss them on the cheek. The term is not used in the United States. (2) In hydraulic engineering, an embankment raised on the margin of a river to prevent inundation. That part of Louisiana which lies on the lower Mississippi was subject in a state of nature to the annual overflow of the river, by which immense damage was done to the land. To guard against these inundations, levees of earth have been thrown up for hundreds of miles along the river banks, to a height sometimes of 15 feet, with a breadth of 30 feet at the base. In front of New Orleans the levee is very broad, and serves as a wharf, steam-boats and other vessels being moored to it. Breaches sometimes occur in the levees, when the water rushes through and does great mischief; these breaches are called crevasses. See MISSISSIPPI LEVEE SYSTEM.

Level. (1) In mining, a horizontal gallery or passage. The workings at different depths are said to be at the different levels—the 50 or 60 fathoms level, and so on. A level which opens to the surface at the side of a valley is called a day level, and forms a means of natural drainage without pumping. A drowned or blind level is a drainage gallery which has the form of an inverted siphon. A dip-head level is the one which proceeds from the foot of the engine-shaft right and left, and from which the rooms diverge. (2) In surveying and engineering, an instrument for indicating a horizontal line or determining the position as to horizontality of an object or surface to which it is applied, and then determining the true level, or the difference of rise or fall between two or more places. There are numerous levels, varying in form, size, arrangement, or construction, according to the purpose for which each is intended; as, for instance, the carpenter’s, mason’s, gunner’s, or surveyor’s levels, the mercurial, water, and spirit levels, etc. All may be divided into three classes: (a) The simplest, such as the mason’s or carpenter’s level, in which the vertical line is determined by a plumb line, and the horizontal by a line perpendicular to it. (b) Those in which the horizontal line is determined by the surface of a fluid at rest; as in the water and mercurial levels. (c) Those in which the horizontal line is determined by a bubble of air

floating in a fluid contained in a glass tube; as a spirit level.

Levellers, the name of an ultra-reform party in Great Britain, which arose in the army of the Long Parliament about the year 1647, and was put down by Fairfax. They aimed at the establishment of an equality in titles and estates throughout the kingdom.

Leveling. See SURVEYING.

Leven, Loch, lōch lē’vn or lēv’n, Scotland, a lake in the county of Kinross, of oval shape, four miles long, two miles broad; greatest depth, 90 feet. It contains several islands, on one of which are the remains of the historic castle of Loch Leven, in which Mary Queen of Scots was confined after her separation from Bothwell and where she escaped shortly before the battle of Langside. The trout fishing of the lake is famous.

Lever, lē-vér, **Charles James**, Irish novelist: b. Dublin 31 Aug. 1806; d. Trieste, Austria, 1 June 1872. He was educated at Trinity College, Dublin, and after studying medicine, partly at Göttingen, he obtained the degree of Bachelor of Medicine from Trinity College in 1831. During the prevalence of cholera in 1832 he gained considerable reputation for his skill and devotion in the treatment of that disease. In March 1834 he contributed his first paper to the new ‘Dublin University Magazine,’ of which he was editor 1842–5. The first chapter of ‘Harry Lorrequer,’ a designation which he afterward made famous as his nom de plume, appeared in the February number for 1837. He removed to Florence in 1847, where he held a diplomatic position, was English consul at Spezzia in 1858 and at Trieste 1867–72. He published: ‘Harry Lorrequer’ (1837); ‘Charles O’Malley’ (1840); ‘Tom Burke of Ours’ (1844); ‘Jack Hinton’; ‘Arthur O’Leary’ (1844); ‘Roland Cashel’ (1850); ‘The Brambleights of Bishops Folly’ (1868); ‘Lord Kilgobbin’ (1872); etc. The rollicking character of the earlier of these was intensely national, and his later novels were more thoughtful and artistic.

Lever, lēv’ér or lēv’ér, one of the mechanical powers, a rod or beam of wood or metal by means of which a small force is enabled to balance or overcome a large one. The lever is supported at some point called the *fulcrum*, and it is movable about this point; the resistance to be overcome (called the *weight*), and the force which overcomes it (called the *power*), are applied at other parts of the lever. In order that the power and weight may balance each other, and so produce equilibrium, two conditions must be satisfied. In the first place, they must tend to rotate the lever round the fulcrum in opposite directions, that is, their moments or rotatory effects round the fulcrum must be of opposite sign; and secondly, the product of the number of units of force in the power into the number of units of length in the perpendicular from the fulcrum on its line of action must be equal to the corresponding product for the weight, or, in other words, the moments of the power and the weight about the fulcrum must be of equal magnitude. In the case of a straight lever with parallel forces, to which all other cases of the straight lever may be readily reduced, the equality of the moments may be tested by substituting the distance from the fulcrum

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along the lever to the point of application of the forces for the perpendicular distance above referred to. Levers are usually divided into three classes. The first includes those in which the fulcrum is between the power and the weight, the second those in which the weight is between the power and the fulcrum, and the third those in which the power is between the weight and the fulcrum.

Leverett, lēv'ér-ět, Frank, American geologist: b. Denmark, Iowa, 10 March 1859. He was educated at Denmark Academy and the Iowa Agricultural College. In 1886 he entered the United States Geological Survey; was assistant geologist 1890-1900; and since 1901 has been geologist. His special lines of investigation are glacial geology and water resources. He is a member of many scientific societies, and has published: 'Water Resources of Illinois' (1896); 'Water Resources of Indiana and Ohio' (1897); 'The Illinois Glacial Lobe' (1899); 'Glacial Deposits of the Erie and Ohio Basins' (1901); and various reports.

Leverett, Sir John, American colonial governor: b. England 1616; d. Boston, Mass., 16 March 1679. At 17 he emigrated to America with his father, and settled in Boston. He returned to England in 1644 to take part in the struggle between the parliament and the king, and as commander of a company of foot soldiers gained military distinction and the friendship of Cromwell. He subsequently resided some years at the court of the Protector, as agent of Massachusetts. On his return to America he held successively some of the most important civil and military offices in the gift of the colony, and finally in 1673 was elected governor. His administration is important in colonial history as the era of the war with King Philip, which his skill and energy were instrumental in conducting to a fortunate issue. Two years previous to his death he was knighted by Charles II. in acknowledgment of his services to the New England colonies during this contest.

Leverett, John, grandson of Sir John Leverett (q.v.): b. Boston 25 Aug. 1662; d. Cambridge 3 May 1724. He was an eminent lawyer and judge, speaker of the colonial legislature, and president of Harvard College from January 1707, until his death. He was a man of unusual attainments, and received the honor, then rarely bestowed upon colonial subjects, of membership in the Royal Society.

Leverrier, Urban Jean Joseph, ür-bān zhōn zhō-zéf lē-vā-rē-ā, French astronomer: b. Saint-Lô 11 March 1811; d. Paris 23 Sept. 1877. He was educated at the Collège Louis Le Grand and the Ecole Polytechnique, and devoting himself to astronomy, made observations which procured him admission to the Academy of Sciences in 1846. About this time he began investigating the perturbations of Uranus. He made calculations with the view of determining the mass and orbital elements of an unknown planet supposed to cause the disturbances, and was able to assign approximately the region where it might be looked for. John Couch Adams (q.v.), then a student at Cambridge, had been making investigations in the same track, and the honor of discovering Neptune (q.v.) is regarded as belonging equally to both. In 1854

Leverrier succeeded Arago as director of the Observatory of Paris, in which post, except an interval from 1870 to 1873, he remained until the end of his life.

Levi, lē'vī, one of the twelve patriarchs, a son of Jacob and Leah. The prince of the Shechemites having wronged his sister Dinah, he, with his brother Simeon, attacked their city and murdered all the males. Jacob reproaches them on his death-bed for this act of cruelty and foretells the dispersion of their descendants: "I will divide them in Jacob, and scatter them in Israel" (Gen. xliv. 7). Three sons went down with Levi to Egypt—Gershon, Kohath, and Merari (Gen. xlvi. 2). Moses and Aaron were of this tribe. See **LEVITES**.

Leviathan (Hebrew) is compounded of two words meaning a *great fish* and *fastened*; hence it probably means a huge fish covered with close scales. The Septuagint renders it *drakōn* (a dragon), and *kētos* (a whale). From the description given of it in the book of Job (xli.) it is usually, and probably correctly, considered to mean the crocodile, though in some places it has been interpreted the whale. See **TRISTRAM'S "NATURAL HISTORY OF THE BIBLE."**

Leviathan, The, a treatise on psychology, ethics and politics, by Thomas Hobbes, published in English in 1651, and in Latin in 1668.

Levin, Lewis Charles, American politician; b. Charleston, S. C., 10 Nov. 1808; d. Philadelphia 14 March 1860. Removing to Woodville, Miss., he became a school teacher and subsequently followed the practice of law in various states, settling permanently in Philadelphia in 1838. The temperance cause attracted him and he edited a temperance organ. Becoming known as speaker and writer, he formed the Native-American Party in 1843 and published *The Sun*, a daily paper, in its interests. As a representative of the party he was sent to Congress and served three terms (1845-51).

Levirate Marriage, among the Jews, the custom of a man's marrying the widow of a brother who died without issue. The same custom or law prevails in some parts of India.

Lévis, François Gaston, frāñ-swā gäs-tōñ lā-vē, DUC DE, French soldier in America: b. Château d'Anjac, Languedoc, 23 Aug. 1720; d. Languedoc 1787. He served in the French army in various campaigns, and in 1756 was ordered to Canada, where he became second in command to General Montcalm. For his services at the defense of Carillon in 1758 he was promoted major-general; and at Montmorenci in 1759 he repulsed the English under Wolfe. After Montcalm's death on the Plains of Abraham, Lévis took command of the French army, and during the winter of 1759-60 he maintained a vigorous struggle against great odds. He was victor at Sainte Foye in 1760, and might have gained Quebec if the French vessels had arrived at the opening of navigation in that spring. Lévis returned to France, where he continued in the military service; and was made a marshal in 1783.

Levis, lā'vē or lē'vīs, **Levis Town, or Point Levi, lē'vī,** Canada, the chief town of Levis County, Quebec, on the St. Lawrence River, opposite Quebec city, with which it has ferry communication. It is an important port with government docks; is the landing place for

transatlantic travelers, and the terminus of a branch of the Grand Trunk, and of the Levis and Kennebec railroads. It is strongly fortified, has several factories, stores, and lumber mills, and carries on a large trade by river and rail. Pop. (1901) 7,783.

Levites, lē'vīts, those of the tribe of Levi who were not priests. They were the ministers specially singled out for the service of the sanctuary, and, with the priests, formed the sacerdotal tribe. After the idolatry of the golden calf the Levites were the first to rally round Moses, and then the idea of a special consecration of 'an Israel within an Israel' developed itself, and the Levites thenceforth occupied a distinct position. They became guardians of the tabernacle, and no others approached it under penalty of death. From the first the Kohathites, as nearest of kin to the priests, had the highest offices assigned them. They bore the vessels of the sanctuary and the ark itself. A permanent arrangement was made for their maintenance. They were to receive the tithes of the produce of the land, and in their turn to offer a tithe to the priests. When the tabernacle should have a permanent place, the whole tribe was to be assigned forty-eight cities, six of which were to be cities of refuge. The Levites were moreover to preserve, transcribe and interpret the law, and to read it every seventh year at the Feast of Tabernacles. They were not included in the general census of the people, but in a separate census (I. Chron. xxiii. 3); their number is given at 38,000. Their position was much changed by the revolt of the ten tribes, and after the captivity, in the movement under Ezra, not more than 38 could be brought together. The purity of their blood was stringently guarded both by Ezra and Nehemiah. After the destruction of the temple in the dispersion, they disappeared from history, being merged in the crowd of captives scattered over the Roman world.

Levit'icus, the third book of the Pentateuch, or five books of Moses. By the later Jews it was called the 'Law of the Priests,' and sometimes the 'Law of Offerings.' It consists of seven sections, but it may be generally described as containing the laws and ordinances relating to Levites, priests and sacrifices. The regulations respecting the sacrifices are classed in three groups, each consisting of ten directions. After this section comes a historical section, giving particulars of the consecration of Aaron and his sons, his offering for himself and the people, and the episode of Nadab and Abihu. Then follow laws concerning purity and impurity; laws relating to the position of Israel as markedly distinct from the nations around; a section of laws concerning the priests, holidays, festivals, etc.; a section of promises and threats; and a final section or appendix on vows. Some critics regard Leviticus as forming part of the Priestly Code, and assert that it was post-exilic and belongs to the latest portions of the Pentateuch.

Lev'ulose, a sugar isomeric with dextrose (q.v.) and always occurring with it in honey, in many fruits, and in other sacchariferous vegetable organs, but distinguished by turning the plane of polarization to the left. See also SUGAR.

Lévy, Emile, ā-mēl lä-vē, French painter: b. Paris 20 Aug. 1826; d. Paris 4 April 1900. He studied at the Ecole des Beaux Arts and was also a pupil of Picot and De Pujol; he won the Grand Prix de Rome in 1854. In 1878 he was awarded a first class medal for a picture he exhibited in the Salon. He had received the cross of the Legion of Honor in 1868, and was much valued as a portrait painter. He was also successful in pastel. Among his works are: 'The Death of Orpheus' (1866) now in the Luxembourg; 'Supper of the Martyrs' (1859); 'The Elements' in the Louvre; and 'Presentation of the Virgin' in the Church de la Trinité, etc.

Levy, lē'vī, Louis Edward, American photo-chemist and inventor: b. at Stenowitz, Bohemia, 12 Oct. 1846. Coming to the United States in boyhood he received his early education at the Detroit public schools. He gave special attention to mathematics and astronomy at the University of Michigan (1866) and to practical optics in Detroit (1861-70). He was connected with the U. S. Lake Survey (1866), made researches in microscopic photography (1867-70) and invented a process in photochemical engraving (1875) called the 'Levy-type.' He received (1896) with his brother Max, a medal for invention of 'Levy line screen,' and (1900) a gold medal for Levy 'acid blast,' both from Franklin Institute, Philadelphia, and a medal and diploma from the World's Columbian Exposition (1893) for original discoveries. He has published and edited in Philadelphia *The Evening Herald* (1887-90); 'The Mercury' (1887-91); and has edited 'The Jewish Year' (1895); 'The Russian Jewish Refugees in America' (1895); 'Business, Money and Credit' (1896). He was elected vice-president of Inventors' Association at Paris in September 1900.

Levy, Uriah Phillips, American naval officer: b. Philadelphia 22 April 1792; d. New York 22 March 1862. Sailing as a cabin boy before his 11th year, he was apprenticed as a sailor in 1804, and before he was 20 had passed through every grade and become master. On 23 Oct. 1812, he was commissioned sailing-master in the navy, serving until June 1813 on the ship Alert and then on the brig Argus. He was placed in command of one of the prizes which the Argus secured, but it was subsequently recaptured and he, with his crew, was imprisoned in England for 16 months. In March 1817, he was appointed lieutenant. Personal antagonism, in which religious prejudice played an important part, subjected him to nearly forty years' struggle, in the course of which he fought a duel, killed his opponent, was court-martialed six times, and finally dropped from the list as captain. He was finally restored to that rank in 1855 and later became commodore. His staunch American spirit was proved by his admiration for Thomas Jefferson, whose home at Monticello he purchased.

Levy, lev'i, (1) a term used in Europe for the compulsory raising of a body of troops from any specified class in the community for purposes of general defense or offense when the existing military forces are insufficient to meet the necessities of the case. When a country is in danger of instant invasion a *levée en masse* is sometimes made—that is, every

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elected lieutenant-governor of the State on the ticket with G. C. Walker. In 1869 he was also elected as a Republican to the United States Senate, where he served from 24 Jan. 1870 to 3 March 1875. He was appointed (1877) by President Hayes United States marshal for the western district of Virginia, but afterward resigned the post.

Lewis, Matthew Gregory, called "Monk" Lewis, English author: b. London 9 July 1775; d. at sea on the way from Jamaica to England 14 May 1818. He was educated at Oxford, in 1794 became a member of the British embassy at The Hague, and in 1795 published '*Ambrosia, or the Monk*' (whence his sobriquet), which had a great success at the time. In 1796–1802 he represented Hindon, Wiltshire, in the Commons. Of his various dramatic works the best-known is '*The Castle Spectre*', first presented in 1798, and abounding in storms and other melodrama. He visited, in 1815–6 and 1817–8, his property in the West Indies, to provide for the suitable treatment of his negro slaves; and published the '*Journal of a West Indian Proprietor*', which is interesting as a description of the condition of the negro in Jamaica of that time. His writings had considerable influence on the early poetry of Walter Scott, for whose translation of '*Götz von Berlichingen*' he obtained the publication in 1799.

Lewis, Meriwether, American explorer: b. near Charlottesville, Va., 18 Aug. 1774; d. near Nashville, Tenn., 8 Oct. 1809. He enlisted in the troops called out for suppression of the "Whiskey Rebellion" in western Pennsylvania in 1794, entered the regular service in 1795 as lieutenant of the line, in 1797 was promoted captain, in 1801–3 was private secretary to Jefferson, and in the latter year was appointed commander of an expedition to cross the continent, with Capt. William Clark (q.v.) as second in command. On 5 July 1803 he left Washington for Pittsburgh, Pa., where the expedition was equipped; but he did not begin to ascend the Missouri until the ice had broken in the spring of 1804. Then he proceeded up the river to its sources, crossed to the Rocky Mountains, reached the headwaters of the Columbia River, floated down that river to the Pacific, and explored a large part of the Oregon region. He had covered in all more than 4,000 miles from the junction of the Missouri with the Mississippi. Having wintered in an entrenched camp on the south bank of the Columbia, he started eastward 23 March 1806, and arrived at Washington 14 Feb. 1807. He received a grant of land and was appointed governor of Louisiana, where he found much confusion, and where he was successful in restoring order. He was a bold explorer, and familiar with Indian matters. Consult memoir by Biddle and Allen (new ed. 1843), and Lighton, '*Lewis and Clark*' (1901; Riverside biography series). See also LEWIS AND CLARK EXPEDITION.

Lewis, Morgan, American statesman: b. New York 16 Oct. 1754; d. there 7 April 1844. He was graduated from the College of New Jersey in 1773, studied law, in 1774 entered the Continental army, was commissioned major in the 2d New York, later became chief-of-staff to Gates with colonel's rank, and quartermaster-general of the northern army. He commanded at Crown Point; and after the war entered legal

practice in New York. Elected to the assembly, he also became judge of the court of common pleas, attorney-general of New York (1791), judge of the supreme court (1792), chief justice of the court (1793), and governor (1804–7). In 1810 he was elected to the State senate, in 1812 became quartermaster-general of the armies of the United States, in 1813 was promoted major-general, and was in command at Sackett's Harbor and French Creek. He was president of the New York Historical Society, and president-general of the Cincinnati.

Lewis, Tayler, American author and educator: b. Northumberland, N. Y., 27 March 1802; d. Schenectady, N. Y., 11 May 1877. He was graduated at Union College in 1820; studied law in Albany, and practised at Fort Miller, but soon gave nearly all his time to the study of classical literature. In 1838 he was appointed professor of Greek at the University of New York, and in 1849 accepted the same professorship at Union College. He attained distinction as a philologist and in Christian apologetics. Besides contributing largely to periodicals, he published the following works: '*The Nature and Ground of Punishment*' (1844); '*Plato contra Atheos*' (1845); '*The Six Days of Creation*' (1855); '*The Bible and Science*' (1856); '*The Divine Human in the Scriptures*' (1860); '*State Rights, a Photograph from the Ruins of Ancient Greece*' (1864); and '*The People of Africa, Their Character, Condition, and Future Prospects*', with E. W. Blyden and Timothy Dwight (1871). He was a member of the Bible Revision Committee.

Lewis, William Draper, American lawyer: b. Philadelphia 27 April 1807. He was graduated at Haverford College in 1828, and at the University of Pennsylvania in 1831. In the latter year he was instructor in legal historical institutions in the Wharton School, University of Pennsylvania; from 1830 to 1836 was lecturer on economics at Haverford, and has edited the '*American Law Register*'. He has written: '*Federal Power over Commerce and Its Effect on State Action*' (1891); '*Our Sheep and the Tariff*' (1891); and many periodical articles on legal, historical, and economical subjects. Among the works which he has edited are '*Wharton's Criminal Law*' (1895); '*Lewis' Edition of Greenleaf's Evidence*' (1896); '*Lewis' Edition of Blackstone's Commentaries*' (1897); '*Digest of Decisions and Encyclopedia of Pennsylvania Laws*'; etc.

Lewis, or Lewis-with-Harris, Scotland, the largest of the Hebrides, separated from the mainland by the Minch, a sea 30 to 35 miles wide. The northern larger portion, Lewis, is in Ross-shire, and is separated by a narrow neck from the southern portion, Harris, which belongs to Inverness-shire. The island is 52 miles long, varies in breadth from 5 to 30 miles, and has a diversified surface, which attains an elevation of over 2,700 feet. Capital, Stornoway. Pop. of island (1901) 32,160.

Lewis and Clark Expedition, The, in American history, a celebrated expedition to the northwestern part of the United States in 1803, under the command of Captain Meriwether Lewis of Virginia, and Captain William Clark, the results of which gave a more definite idea of our natural resources in this hitherto unexplored region than had ever been known. Recognizing

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the importance of a thorough and accurate knowledge of the vast extent of country acquired by the United States with their independence, Thomas Jefferson, while minister to France suggested to the traveler, Ledyard, an exploration of western America. Nothing came of it, however. In 1792 he made a similar proposition to the American Philosophical Society (q.v.), and Michaux, the celebrated traveler and botanist, proceeded as far as Kentucky, when he was recalled by the French minister. In January 1803, in a confidential message to the Congress, President Jefferson recommended an appropriation for this purpose. It was granted and he appointed Lewis, who had been his private secretary nearly two years, to the command of the expedition along with Clark. They made an adventuresome journey with a small party of soldiers, guides and Indians to the unknown northwest. Their travels extended to the Pacific Ocean on the west and the Columbia river on the north. The expedition was highly successful and reports of the greatest value were received by the government at intervals covering a period of three years. Afterward a highly interesting account of the expedition and its discoveries was published. This volume for 100 years has been one of the most valued of American historical works and as late as 1903 no less than three reprints of the book were published. Lewis was a man of great energy and perseverance, and upon his return was appointed governor of the Louisiana Territory.

Lewis Fork. See SNAKE RIVER.

Lewisburg, lü's-berg, Pa., borough, county-seat of Union County; on the Susquehanna River, and on the Philadelphia & R. and the Pennsylvania R.R.'s; about 50 miles north of Harrisburgh. It is on the border of the great anthracite coal fields, and in a fertile agricultural valley. Its chief manufactures are flour, lumber, furniture, shirts, woolen goods, machine shop products, and acetylene gas. Its trade is chiefly in its manufactured products and in grain and vegetables. It is the seat of Bucknell University, opened in 1846 under the auspices of the Baptists. Pop. (1900) 3,457.

Lewisburg, Battle of. On 21 May 1862 Gen. Heth, with a Confederate force of three regiments of infantry, a battalion of dismounted men, a regiment of cavalry and three batteries, aggregating about 2,200 men, marched from Salt Sulphur Springs, Va., on Lewisburg, 24 miles distant, to surprise Col. Geo. Crook who was encamped at that place with about 1,500 men. Heth marched through Union, crossed Greenbrier River, driving in Crook's pickets, and at 5 A.M. of the 23d formed line on a hill east of the town, Crook's camp being on the west side. Crook threw out a well supported skirmish line, which soon engaged Heth's advance; Heth at first had some success, but was gradually forced back; Crook charged his main line; a panic seized Heth's troops, and they fled from the field in disorder, retreating across the Greenbrier and burning the bridge behind them. Heth left on the field 38 dead and 66 wounded, four guns, and over 200 stand of small arms. Over 100 of his unwounded men were captured. Crook's loss was 13 killed, 53 wounded, and 7 missing. Consult: 'Official Records,' Vol. XII.;

The Century Company's 'Battles and Leaders of the Civil War,' Vol. II.

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Lewiston, lü's-tön, Maine, city, in Androscoggin County; on the Androscoggin River, and on the Maine C., and the Grand T. R.R.'s; about 28 miles southwest of Augusta, and 32 miles north of Portland. It was settled in the early part of the 17th century but was founded as a district in 1770, and called "Plantation of Lewiston" until 1795, when it was incorporated as a town, and was chartered as a city in 1861. Lewiston is located in an agricultural region, but the extensive water-power has contributed toward making it a manufacturing city. The river here has a fall of about 50 feet, and the power is utilized by means of a distributing dam and canal. Bridges connect the city with Auburn on the opposite side of the river. The chief manufactures are cotton and woolen goods, foundry products, machinery for cotton and woolen mills, engines, boilers, brick, lumber, belting, boots and shoes. The dye works and bleacheries are quite extensive. Some of the principal buildings are the Carnegie library, in which are the Manufacturers' and Mechanics' library, having over 10,000 volumes; a city hall, Healy Asylum (R. C.), Hospital of Our Lady of Lourdes (R. C.), two convents, several fine churches and schools. It is the seat of the Bates College (q.v.) which includes the Cobb Divinity School. Pop. (1890) 21,701; (1900) 23,761.

Lewiston, N. Y., village, in Niagara County; on the Niagara River, and on the New York Central & H. R. railroad; seven miles north of Niagara Falls, and about 25 miles north of Buffalo. It has communication by steamer with a large number of lake ports. The place where Lewiston now stands was the site of an Indian village. In 1720 the French took possession of the place, but abandoned it in a few years, when it was again occupied by the Indians. Joseph Brant's home was in this vicinity. On 14 Sept. 1763 occurred the Indian massacre at Bloody Run, a place near Lewiston. The first white settlement was made about 1800, and in 1818 the town was incorporated, and in 1843 the village. On 19 Dec. 1813 Lewiston was burned by the English and Indians. The place is now a favorite summer resort. Pop. (1900) 697. Consult: Pool, 'Landmarks of Niagara County.'

Lewistown, Ill., city, county-seat of Fulton County; on the Chicago, B. & Q. and the Fulton County Narrow Gauge R.R.'s; about 50 miles northwest of Springfield. It is situated in an agricultural region and is the trade centre of a large part of the county. Its chief manufactures are carriages and wagons, flour, lumber, brick, tile, furniture, and dairy products. Livestock and farm products are shipped from Lewistown to the large markets. Pop. (1900) 2,504.

Lewistown, Pa., borough, county-seat of Mifflin County; on the Juniata River, and on the Pennsylvania railroad; about 60 miles northwest of Harrisburg. It is situated in a fertile agricultural region in which are valuable mineral deposits. Lewistown is a trade centre for an extensive farming section; but it is also a manufacturing borough. The chief manufactures are steel, iron, flour, leather, lumber, foundry and

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machine-shop products, hydrants, and pumps. Lewistown and vicinity are now favorite summer resorts. Pop. (1900) 4,451.

Lexicography. See DICTIONARY.

Lexington, lēk'sīng-tōn, Ky., city, county-seat of Fayette County; on the Lexington & E., the Southern, the Chesapeake & O., the Kentucky & I. B., and the Louisville & N. R.R.'s; about 82 miles south of Cincinnati, and about 22 miles southeast of Frankfort, the capital of the State. The first settlement was claimed by a party of hunters, who, in 1775, camped at this place and named it Lexington in honor of the battle of Lexington. They built a log cabin on the site so as to leave a proof of their ownership. Four years later Robert Patterson, one of the hunting party, made here a permanent settlement. Three years afterward the town was incorporated by the legislature of Virginia, as this section was then a part of Virginia. In 1792, when Kentucky became independent of Virginia, Lexington was made the capital of Kentucky, and the first Kentucky legislature met in this city. The city was granted a charter in 1832. Lexington is located in a fertile agricultural country, the famous "blue-grass" region. Its chief manufactures are Bourbon whisky, harnesses, saddlery, flour, canned goods, lumber, carriages and wagons. Some of the important institutions are Kentucky University (Christian), Sayre Female Institute, Hamilton and McClelland Female Colleges, Saint Catharine's Academy (Roman Catholic), State Agricultural and Mechanical College, and the Kentucky Reform School. It has the State Asylum for the Insane, Saint Joseph's Hospital (Roman Catholic), Colored Industrial Home, and a Protestant infirmary. It has an excellent public library. The race tracks, the stock farms in the vicinity, the parks, all have made Lexington well known in connection with industries and amusements. Henry Clay made this city his home from 1797 until his death. Pop. (1890) 21,567; (1900) 26,369.

Lexington, Mass., town, in Middlesex County; on the Boston & M. railroad; about 12 miles northwest of Boston. The town contains the villages of Lexington, East Lexington, and North Lexington. Lexington was settled in 1642, was long known as "Cambridge Farms," and was incorporated as a town in 1713. It was the scene of the first conflict between the colonists and the British troops in the Revolutionary War, on 18 April 1775. The British obtained the advantage and destroyed the stores of the colonists, but lost in the action 273 men killed and wounded. Lexington is situated in an agricultural region, and its industries are connected chiefly with the products of the farms and the trade necessary for supplying local wants. It has important leather-binding works. It contains many points of interest, some of which are the first battleground of the Revolutionary War, the monument commemorative of this battle; the Monroe Tavern, built in 1695, which was Earl Percy's headquarters; the old Belfry clubhouse; and the Hancock-Clarke house (1698), where Samuel Adams and Hancock lodged the night before the battle. The last mentioned building is now used as a museum for Revolutionary and early settlement relics. A number of monuments in honor of the men and events

which made Lexington famous adorn the city. It contains the Cary Library with nearly 25,000 volumes; a fine high school, the Hancock and Adams grammar schools, a town hall, and a number of fine churches and elegant residences. The old burying ground, visited annually by hundreds of people, is mute witness of the noble people who have lived in this town. Pop. (1900) 3,831.

Lexington, Mo., city, county-seat of Lafayette County; on the Missouri River, and on the Missouri P. and the Atchison, T. & S. Fe R.R.'s; about 63 miles southeast of Saint Joseph and 39 miles east of Kansas City. The first permanent settlement was in 1825, and it was incorporated in 1830. Lexington was the scene of a siege in 1861, when a Confederate force of 18,000 under Gen. Sterling Price, attacked the city, which was defended by a Federal force of 3,000 men under Col. James Mulligan. The Federals surrendered on 20 Sept. 1861, but Price left the place a few days later, and put on guard a small force. On 16 October, a Federal force of 230 men under Major J. White entered the city, released the Union prisoners and took the Confederates captive. The city is in the midst of a fertile agricultural region, in which hemp is cultivated extensively. Coal is mined in the vicinity of the city. Lexington is the seat of the Central Female College, the Baptist Female College, and the Wentworth Military Academy. Pop. (1900) 4,190.

Lexington, Va., town, county-seat of Rockbridge County; on the north fork of the James River, and on the Baltimore & O. and the Chesapeake & O. R.R.'s; about 110 miles west by north from Richmond, and 44 miles northwest of Lynchburg. It is in a rich farming valley west of the Blue Ridge. Valuable deposits of sulphur ore are in the vicinity. The chief manufactures are dairy products, agricultural implements, flour, and lumber. The city owns and operates the waterworks. The water is brought some distance from springs in the mountains. Lexington is the seat of the Virginia Military Institute, opened in 1839, and the Washington and Lee University (q.v.). Generals Jackson and Lee are buried here, and statues have been erected in their memory. The mineral springs in the vicinity are becoming popular resorts; the Natural Bridge (q.v.) one of the natural curiosities of America, is about 15 miles south, separated from Lexington by low mountains or hills. Pop. (1900) 3,203.

Lexington, Siege of. After the battle of Wilson's Creek (q.v.), Mo., 10 Aug. 1861, Gen. Sterling Price, abandoned by McCulloch and his troops, appealed to the secessionists of Missouri to fill his depleted ranks; and about the middle of August he moved northward toward the Missouri River, skirmished with a force under Gen. J. H. Lane, 7 September, at Dry Wood Creek, drove Lane out of the State, and followed as far as Fort Scott, which had been abandoned. On the 10th he was at Rose Hill, from where he marched for Warrensburg, which was reached on the 11th, Peabody's 13th Missouri at that place retreating to Lexington. When Fremont, at St. Louis, heard of Price's northward movement, he ordered to Lexington a force which, when Price arrived at Warrensburg, numbered 2,800 men, with seven 6-pounder

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guns, under command of Col. James A. Mulligan, 23d Illinois. Mulligan took position and threw up intrenchments on College Hill, a bluff 200 feet above low-water mark, northeast of the city, overlooking it and the Missouri, and on which was a substantial brick building erected for a college. Immediately in front of the college was the first line of works, outside of which was a broad ditch, and beyond were "confusion" pits. On the morning of the 11th Price marched from Warrensburg toward Lexington, and that night, after a march of 30 miles, halted three miles from the city, where he rested until dawn, when he drove in Mulligan's pickets, and from four different points opened a cannonade upon the hastily constructed works around the college. After several sharp encounters the Confederates captured some outworks and drove Mulligan's men behind the main line. At the end of the day Price withdrew to the fair ground, two miles away, to await reinforcements and ammunition. Mulligan, looking for reinforcements, strengthened his position and prepared for a siege. Price was anxious because he knew of the approach of Union troops to relieve Lexington; but being reinforced to 25,000 men, and his ammunition coming up, he again moved on the city on the 18th, took possession, closed in upon Mulligan, and began a siege. Rains' and Parsons' divisions occupied strong positions on the east, northeast, and southwest of the works; Rives' division, supported by McBride's command and a part of Harris', moved along the river bank to a point immediately beneath Mulligan's works; fire was opened upon the Confederates from a dwelling on the bluff, 125 yards from the works; upon which the Confederates charged and took the house, and also the bluff immediately north of it. A gallant counter-charge by Capt. Gleason, with 80 men of the 23d Illinois, retook the house, but it was soon regained, and the adjoining heights fortified. Firing continued all day of the 19th; water gave out, but Mulligan encouraged his men to hold on until help arrived. On the morning of the 20th Price caused to be taken to the river heights a number of hemp-bales, with which movable breastworks were constructed. These were rolled forward; under cover of them the Confederates moved to within ten rods of the works; and at 2 p.m., after over two days' continuous fighting, Mulligan's men being without water or rations, and short of ammunition, a white flag was displayed, and Price ordered a cessation of firing. Mulligan had lost 42 killed and 108 wounded, and surrendered 1,624 men, 7 guns, many horses, and a large amount of stores. Price reported a loss of 25 killed and 72 wounded. Price remained at Lexington until 30 September, when, pressed by the Union advance from Jefferson City, he abandoned the place and retreated toward Arkansas, leaving a guard of 500 men with the prisoners taken. On 16 October a squadron of cavalry under Maj. F. J. White surprised the party, captured 70, and released the prisoners. Consult: "Official Records," Vol. III.; The Century Company's "Battles and Leaders of the Civil War," Vol. I.

E. A. CARMAN.

Lexow, lëk'sow, Clarence, American lawyer and politician: b. Brooklyn, N. Y., 16 Sept.

1852. He studied abroad and at the Columbia Law School, graduating from the latter in 1872. He was admitted to the bar and established practice in New York city, receiving a large German-American patronage, and engaging in many important litigations. In 1882 he became a resident of Nyack, and was active in the Republican party there. In 1890 he was an unsuccessful nominee for Congress, but lowered the usual Democratic majority. In 1893 he was elected to the State Senate where he served till 1898. Here he at once became a leader, was chairman of the committee on internal affairs, and introduced the bi-partisan police bill calling for an investigation of the New York city police. This led to the appointment of the so-called "Lexow Committee," of which he was head; the investigations of this committee brought to light the system of protection of vice by the police in New York, and were the direct cause of the reform campaign and the election of Mayor Strong. Lexow was also the introducer of the bill creating the city of Greater New York, was chairman of the joint legislative committee for the investigation of trusts and unlawful combinations, of the committee on primary elections reform and of the judiciary committee. In 1896 he was chairman of the committee on resolutions at the Republican State convention, and introduced the gold standard plank in the platform; in 1900 he was a presidential elector. He is author of reports on "Municipal Government" and on "Trusts and Unlawful Combinations".

Leyden, li'dén, or Leiden, Netherlands, an important town in the province of South Holland, 22 miles by rail southwest of Amsterdam, on both sides of the Old Rhine, which flows through the town by several branches. The neighborhood is marked by wind-mills, country-seats, pleasure-grounds, gardens, and fertile meadows, and street railroads connect with the bathing resort of Katwyk, 5 miles to the northwest on the North Sea. The streets are straight, broad, and clean; Broad Street (*Breede-straat*) being esteemed one of the finest in Europe. In it is situated the town-hall (*Stadhuis*), originally founded toward the end of the 16th century, a picturesque building, with 30 windows in a line in front, a tall spire, and three highly ornamented projecting gables. In the council-chamber are the painting of the "Last Judgment," by Lucas van Leyden, and several good historical portraits; in part of the lower floor is situated the meat-market. None of the churches are remarkable; the Reformed Church of St. Peter contains monuments to Boerhaave, Spanheim, Scaliger, etc. The most important educational institution is the university, formerly one of the most famed in Europe, and still in excellent repute. It is attended on the average by about 800 students, nearly one half studying law. Connected with the university are a well-laid-out botanic garden, an observatory, a library, with numerous manuscripts, an anatomical theatre and museum of comparative anatomy, one of the richest collections of natural history in existence, cabinet of coins, museum of antiquities, and a rich Japanese museum. Leyden was noted for its cloth manufactures, which after 1670 declined, but have revived in recent years, now employing about 1,500 operatives. There are also various other branches of manufacture, and the former great

LEYDEN JAR—LHASA

trade in books, carried on in the latter part of the 17th and during the greater part of the 18th century, and rendered world-renowned by the Elzevirs, is represented by several printing offices. There is an extensive trade in agricultural produce, especially cheese and butter.

The most memorable event in the history of Leyden is the successful siege it maintained against the Spaniards in 1573-4 until relieved by the action of the Prince of Orange in breaking down the dikes. Leyden is the birthplace of John of Leyden, the founder of the Anabaptists; Camper, Muschenbroek, the brothers Gerard and Isaac Vossius, Gronovius, Rembrandt, Luke of Leyden, the brothers Van der Velde, Gerard Douw, etc. Pop. (1900) 54,421.

Leyden Jar. See ELECTRICITY.

Leys, Henri Jean Auguste, öñ-ré zhōñ ð-güst lis, or là, Belgian painter: b. Antwerp 18 Feb. 1815; d. there 25 Aug. 1869. He worked from 1829 to 1832 in the studio of his brother-in-law, Ferdinand de Braekeleer, and in 1833 exhibited in Brussels, 'Fight Between a French Grenadier and a Cossack.' He, attracted still further attention by his picture 'Fight of Burgundian and Flemish Soldiers.' His style changed after his visit to Paris 1835; during which he confined himself to a study of the French Romantic school. Yet while the modern manner is discernible in his works, he shows himself also under the influence of Van Dyck and Rembrandt in such pictures as: 'Flemish Wedding'; 'A Painter's Studio'; 'A Family Party in Brittany'; 'Burgomaster Six at Rubens' House'; etc. In 1839 he still further modified his manner after traveling in Holland and familiarizing himself with the Dutch genre painters. It was certainly under their inspiration that he painted such pictures as 'A Family Party' (1845); 'Divine Services in Holland' (1850); etc. After completing his travels in Holland he still further changed his style and painted in the bizarre style of Quentin Matsys, whose naïveté and uncouthness he also reproduced. In 1863 he received a commission to decorate with frescoes the town hall of Antwerp, and this he fulfilled by producing a fine series of scenes from the history of the city. He was also an etcher, lithographer and wood engraver of acknowledged skill.

Leyte, lá'tā, Philippines, a province consisting of the island of Leyte and 40 dependent islands; area of Leyte 3,872 square miles; area of dependent islands 342 square miles; total 4,214 square miles. Leyte lies southeast of Luzon, southwest of Samar, from which it is separated by the narrow strait of San Juanico, and northwest of Mindanao; its extreme length from northwest to southeast is 121 miles. The two most important dependent islands are Biliran, area 144 square miles; and Panaón, area 76 square miles. They are both mountainous; Biliran is noted for its sulphur springs; Panaón is well populated and has some gold deposits. The interior of the island of Leyte is mountainous, there being a number of extinct volcanoes, and the island is crossed by a number of large rivers; the coast line is irregular, indented by a number of bays, some of which afford excellent harbors, among the best in the Philippines. There are numerous roads on the east coast, and the west coast is also paralleled by roads and trails for almost its entire length;

the rivers furnish good inland transportation. The province is one of the best cultivated in the archipelago; the most important product is hemp and many of the plantations being under cultivation for almost 50 years require little work, the crop being abundant and of excellent quality; other products are rice for home use, chocolate, sugar, coffee, and corn. The mineral products include sulphur, gold, iron, lead, and silver; of these the most important is sulphur, which supplied the gunpowder works at Manila under Spanish rule. There are also valuable forests; the yield of dammar, the brea or pitch of the Spaniards, is the most important in the Philippines. The largest industries are the manufacture of abaca and the cabonegro or black boat cables from the hemp, and the extracting of cocoanut oil. There are also ship-building yards at Tacloban, at which good sized schooners are often built, and weaving of fine fabrics by the women. Civil government was established in April 1901; the people proved generally favorably inclined to the new regime, and there was renewed activity in every line of industry; before December of that year the United States troops were withdrawn from a number of the towns, which had been garrisoned, and they were protected entirely by the native police. Pop. 270,500, mostly Visayan.

Lhasa, lhă'să or Lassa, lăs'să, Tibet, the capital of the country, and the "Rome" or "Mecca" of Buddhism, its name signifying the "Place of God," is picturesquely situated in a valley plain surrounded by mountains rising from the Ki-chu, a left affluent of the Sango or Upper Brahmaputra, about 280 miles in a direct line northeast of Darjiling. Access being exclusively forbidden to Europeans, three only having visited it during the 19th century, the place has a mysterious celebrity, which has been enhanced by unsuccessful western attempts to reach it. The most recent information has been obtained from native Hindu pilgrims and explorers in the employ of the British Government. Broad roads lined by luxurious gardens lead past the well-built houses of the suburbs to the closely guarded gates of the walled city, which is dominated by the imposing Potala hill-palace, and other hill-top edifices. The principal streets of the city are wide, regular, and clean, lined with well-stocked stores and houses of two and three stories; but the side streets and lower parts of the town are very dirty and daily crowded by importunate beggars. The houses are built of stone, brick, or earth, terraced at the summit, and uniformly whitened externally, the windows and door-frames being painted with the sacred or *lamanesque* colors, red and yellow. Internally, however, they are exceedingly dirty and comfortless. The public edifices worthy of notice are connected with Buddhist monasteries. In the heart of the city is the convent of Moru, with a large printing establishment, from which numerous religious works are issued; and on the outskirts, toward the cardinal points, are four other large monasteries—Praebung on the west, Sera on the north, Khaldan on the east, and Samie on the south or southeast side. All these have several thousand inmates, being greatly resorted to from China, Turkestan, Nepal, etc., as schools of philosophy and Buddhism. About 1½ miles northwest from the city, and connected with it by two avenues of trees, is the Potala,

L'HÔPITAL—LI HUNG CHANG

Bottala, or Buddha-la, the residence of the Dalai or Talé (Grand) Lama, the ecclesiastical sovereign of Tibet, and supreme pontiff of the vast regions forming central, eastern, and southeastern Asia. A triple-peaked hill here rises abruptly out of the plain to the height of 367 feet; it is covered with convents and cells of monks, and in the centre is the palace of the Dalai Lama, a fine edifice, four stories in height, with a vast number of apartments and a large dome, which, like the columns of the peristyle surrounding the structure, is covered with gilding. The interior is full of idols, treasure, and works of art. Lhasa is the principal emporium of Tibet, and a rendezvous of people from all parts of Asia; silk stuffs, tea and other articles being here exchanged for Tibetan, Indian, and European goods. British troops under Col. Young-husband were ordered into Tibet in the autumn of 1903, apparently to occupy Lhasa, and thus control the entire Buddhist population of Asia, in behalf of British interests. Pop. of city estimated at 15,000, but in addition there are a large number of Buddhist lamas or priests, and students in the monasteries.

L'Hôpital, Guillaume François Antoine, gē-yōm frān-swā āñ-twāñ lō-pē-tāl, MARQUIS DE ST. MESME, French mathematician: b. Paris 1661; d. 2 Feb. 1704. He devoted himself exclusively to the study of mathematics, having had Jean Bernouilli for a short time to give him instructions in the differential and integral calculus, and at the age of 32 distinguished himself by solving problems proposed to the lovers of mathematics by Jacques Bernouilli; and 1693 was admitted an honorary member of the Academy of Sciences at Paris. From that period he published, in the French and foreign journals, solutions of difficult questions, and other mathematical communications. Such was his reputation that Huygens, profound as was his acquaintance with science, applied to L'Hôpital for information relative to the nature of the differential calculus. This led to the publication of his 'Analyse des Infiniment Petits' (1696), the first French work on the subject, of which a new edition was published by Lefevre (1781). Besides the work mentioned he was the author of 'Les Sections Coniques, les Lieux Géométriques, la Construction des Equations' (1707); and 'Une Théorie des Courbes Mécaniques.'

L'Hôpital, Michel de, mē-shēl dē, French statesman: b. Aigueperse, Puy de Dôme, France, about 1504; d. Chateau Bellebat, near Etampes, France, 15 March 1573. He studied law in Italy, and returning to France was president of the court of accounts in 1554, and chancellor of France in 1560. To his moderate policy were due the edict of Romorantin, 1560, which prevented the introduction of the Inquisition in France; the edict of pacification, 1562, authorizing the free exercise of Protestant worship; and the ordinance of Moulins, 1566, which aimed at reform in the administration of justice. Distinguished for his integrity and moral courage, L'Hôpital stood far in advance of his time in his support of toleration and civil liberty. He gave up his office in 1568.

Li, lē, or Cash, a copper coin of China, with a square hole in the middle, and an inscription on one side. The value of a li in American money is about $\frac{1}{8}$ of one cent. Li is also a Chi-

nese measure of length equal to about one third of an English mile.

Li Hung Chang, lē hoong chāng, Chinese statesman and diplomatist: b. Lu-chow, province of Ngan-hwei, 16 Feb. 1823 (or perhaps 1819); d. Peking 7 Nov. 1901. He received a thorough education, passing through the successive grades of scholarship, with the severe examinations which in China must be undergone before admission to the literary caste, "ahead of 15,000 competitors". In 1847 he received the third degree, and entered the Hanlin College in 1849. In 1850, when the Tai-ping rebels invaded Ngan-hwei, he joined Tseng Kuo Fan's army as secretary. He was appointed judge of Chekiang province, and in 1861 governor of Kiang-su. In 1863, in conjunction with Colonel (afterward General) Charles George Gordon (q.v.), known as "Chinese Gordon", he retook Su-chow, and drove the rebels entirely out of Kiang-su. Gordon's force, the "Ever-victorious Army", had previously been commanded by Frederick T. Ward, an American soldier of fortune, and was largely composed of foreigners. From them Li Hung Chang derived much information concerning Europeaus, and also acquired increased military knowledge and ideas of western political ethics. For his services in suppressing the Tai-ping rebellion Li was made commander of the imperial forces, head of the navy, a hereditary noble, and received the highest decorations in the gift of the emperor. In 1864 he was appointed governor of the Kiang provinces. During the Nien-fei rebellion (1868) he was degraded for apathy in the face of the enemy, but was soon restored to favor. In 1872, after the massacres at Tien-tsin, followed by his stern measures of redress, he was appointed viceroy of Chi-li, the metropolitan province. During his long service in that office he resided at Tien-tsin, where he displayed his progressive designs by many improvements, among which were a great canal and the forming of the Chinese Merchants' Steam Navigation Company. Here for 24 years (1870-95) he exercised a power in reality second only to the emperor's, controlling the foreign policy of the empire, and introducing modern tendencies from western civilization. He negotiated important treaties with Japan, Peru, and other countries, increased the military strength of China in view of foreign encroachments, and may be said to have created the Chinese navy. He was imperial commissioner of trade for the northern ports; the emperor entrusted to him supreme charge of the military and naval forces sent to Korea in the Chino-Japanese war; and though several times distrusted and disgraced, he bore nearly the whole burden of the war, marine, and financial departments of the Chinese government. During the war with Japan the disasters to the Chinese armies and navy were laid to his charge, and he was degraded and punished, but still retained his office of prime minister. He was sent to Japan in 1895 to negotiate the peace treaty, and barely escaped assassination. Having represented China at the coronation of Nicholas II. of Russia in 1896, he made a tour of the world, and was everywhere received as a highly distinguished guest. After the suppression of the uprisings of 1900-1 he played a prominent part in adjusting the relations of China with foreign powers.

LI HUNG CHANG.

LI HUNG CHANG.

LIBBEY — LIBERAL REPUBLICAN PARTY

imports colonial produce, manufactured goods, coals, etc. Pop. (1897) 64,505.

Lib'bey, William, American scientist: b. Jersey City, N. J., 27 March 1855. He was graduated from Princeton in 1877 and since 1880 has been professor of physical geography there. He is a fellow of the geographical and geological societies of London and Paris.

Lib'by, Laura Jean, American novelist: b. New York 22 March 1862. She was married to Van Mater Stilwell in 1898. Her earliest writings were contributed to the New York Ledger and other story papers. Among her many fictions are: 'Lovers Once but Strangers Now'; 'When His Love Grew Cold.' The literary merit of her work is very slight.

Libby Prison, a famous prison at Richmond, Va., during the Civil War. It was a large brick structure named for its owner who used the building as a ship chandlery before the War. The Confederate government early secured it as a military prison for Federal soldiers, and many thousands were confined here. In 1863 and 1864 there were many deaths from disease and lack of food. In 1892, the building was torn down and removed, brick by brick, to Chicago, and set up there as a museum, but the enterprise proved a failure.

Libel, (1) a defamation of a person, with malice expressed or implied, made public by means of writing, printing or pictures, calculated to provoke him to anger, or expose him to hatred, ridicule or contempt. Spoken words, however opprobrious or injurious, do not amount to libel but are classed as slander; and, being more limited in their publicity, the offense is not so great as in a case of libel. There may be a libel by traducing the memory of one who is dead, as well as one which attacks the reputation of one who is living. Any publication which has a tendency to disturb the public peace or good order of society, is actionable as a libel, and may usually be prosecuted by either a civil action for damages or by a criminal proceeding, and both remedies are often pursued at the same time. In the absence of some statutory provision on the subject, proof of the truth of the matter contained in the libel does not ordinarily furnish a good defense to the offending party. The publication may be very limited and yet amount to the offense. The malicious reading of a libel to one or more persons has been held sufficient and the sale of each copy of a book containing a libel has been pronounced by a court as sufficient to furnish a distinct offense. Libels against the government consist of calumnious publications in denunciation or unwarrantable criticism of the established governmental system or in censure of methods of administration, provided the allegations are of such a nature that their natural tendency or evident purpose is to promote disaffection among the citizens or to excite a spirit of revolution. But indictments for libels of this character are very rare, and would not be resorted to except in extreme and very plain cases. Many of the States have enacted statutes upon the subject of libels, declaratory of the old common law rules, with ancillary provisions, relating principally to forms of administration, with provisions as to punishment. A libel may be a misdemeanor

only, or a felony, according to the character of the offense.

(2) Libel in admiralty practice denotes the complaint or pleadings by which an action is commenced, to enforce some claim or right in a marine matter, and contains a circumstantial statement of the claim. The general scope of the jurisdiction of admiralty embraces all marine contracts and maritime torts, including captures in time of war, and seizures for revenue forfeitures, and all duties appertaining to marine commerce and general navigation. The test of jurisdiction in torts is determined by the place where the same were committed. Such a libel is not required to be drawn with any degree of technicality, the substance being more important than the form. In the United States substantially all admiralty matters are transacted in the Federal courts. The plaintiff, or moving party in an admiralty proceeding, is called the libellant, and the defendant, or party against whom the proceeding is brought, is termed the libatee or respondent. Sometimes a libel is directed *in rem* or against property only, without naming a respondent.

HENRY HARDWICKE.

Liberal Party, in politics, the party which claims to be distinctively that of reform and progress with a view to vast increased political power in the people, and to extend privileges to the masses. Most European countries have a liberal party, but in several of them, such as Germany, Belgium, and France, liberalism has lost heavily owing to the rapid spread of socialist doctrines, which involve economic and industrial rather than political reform. In Great Britain, Liberal and Conservative ministries follow each other at irregular intervals, and on the whole the system has worked well. The greatest of modern Liberal leaders was Gladstone, but his introduction, in 1886, of the Irish Home Rule and Land Purchase Bills alienated many of his supporters, and led to the formation of the Liberal Unionist Party. On the question of the war policy in South Africa in 1899-1901 the Liberal opposition was split into several groups, such as the Liberal Imperialists, who supported the government; the so-called "pro-Boer" Liberals, who opposed the war throughout; and those who, like Sir Henry Campbell-Bannerman, tried to combine both policies.

Liberal Republican Party, in American politics, a party organized in 1872 by Republicans, who were dissatisfied with General Grant's first administration as President. At a convention held by them in Cincinnati, in that year, Carl Schurz was elected its president, and a platform adopted demanding civil service reform, local self-government, and universal amnesty, recognizing the equality of all men, recommending the resumption of specie payment, etc. Horace Greeley and B. Gratz Brown were named for President and Vice-President. This platform and these nominations were adopted by the regular Democratic convention of that year, but dissensions arose, and other candidates were nominated, the result being that the Republican nominee, General Grant, was elected by an overwhelming majority and the Liberal Republican party was thereafter practically dead. The real strength of the party lay in its presidential candidate, Horace Greeley, who had

LIBERAL UNIONIST PARTY — LIBERIA

a large following, particularly of the farming element throughout the country, which was secured through the large and widespread circulation of the New York 'Weekly Tribune,' of which Greeley was the editor. See also GREELEY, HORACE.

Liberal Unionist Party, in British politics, a party formed in 1886 by the Liberals under the leadership of the Marquis of Hartington who objected to Gladstone's Irish Government and Land Purchase bills, as being dangerous to the empire. They gained their immediate object by coalescing with the Conservatives, and in the election which followed the defeat of the Gladstonian ministry they succeeded in returning some 80 members to parliament. They have since acted with the Conservatives.

Liberator, The. See GARRISON, WILLIAM LLOYD.

Liberia, li-bē'ri-a, Africa, a negro republic on the west coast between Sierra Leone and the Ivory Coast. A convention with France in 1892 fixed the Cavally River as the southeastern boundary, and restricted the inland territories of the republic. The area is estimated at 35,000 square miles. It was founded as a colony of free blacks by the American Colonization Society in 1820, under the philanthropic idea that many, if not all, of the liberated slaves would prefer returning to Africa to staying in America, where, at that time, they were denied political rights. Liberia was declared an independent state in July 1847, and in the following year was recognized as such by Great Britain and France, when a treaty of trade and commerce with the state was concluded. A large proportion of the inhabitants speak English. The government of the country is on the model of that of the United States, consisting of a president, a vice-president, a senate, and a house of representatives. It is provided that on the increase of the population each additional 10,000 shall have a representative. For political and judicial purposes the republic is divided into counties and townships. The counties are four in number, and called Montserrado, Grand Bassa, Sinoe, and Maryland. Each town is a corporation, with elected municipal officers. Monrovia (pop. 13,000), the capital and port of the colony, is situated on Cape Mesurado. There are besides a number of towns or villages in the territory.

The general line of the coast (about 500 miles) is from northwest to southeast. There are several inlets and harbors at Cape Mount, Cape Mesurado, Cape Palmas, and Bassa Cove. There are many rivers, of which the principal is the St. Paul, which enters the ocean at Cape Mesurado. It is about half a mile wide, and at low tide has seven feet of water on the bar at its mouth. It is navigable only about 18 miles from the sea. The other largest rivers are the St. John, which empties at Bassa Cove; the Junk River, which runs between the St. Paul and the St. John; Cape Mount River, which flows into the sea at Cape Mount; and the Grand Sesters, east of the St. John, which has 14 feet of water over the bar at its mouth. The land on the coast is generally low and sandy, except near the capes, which are elevated, and in the southeast, where the shore is bold and rocky. From the coast the land gradually rises, until at the distance of 30 miles inland it swells into

forest-covered hills, and in the remoter interior into mountain ridges divided by fertile valleys. The soil is generally good, though there is some poor land. It is of a yellowish color, and tinges the rivers which flow through it. There is little swamp land, the country being almost universally broken and rocky or gravelly. The climate is that common to regions near the equator. There are two seasons, the wet and the dry. The former begins with June and ends with October. Rain falls during the greater part of this season, though not without intervals of clear skies and successive days of fine weather, especially in July and August. In the dry season rain is rare, though there are occasional showers. The average heat of the year in Monrovia is 80° F., that of the rainy season being 76° and of the dry 84°. The mercury seldom rises above 90° in the shade and never falls below 60°; the daily variation seldom exceeds 10°. June is the coolest month, and January the hottest. During the hottest months, January, February, and March, the heat is mitigated by the constant winds, the land breeze blowing from midnight until near midday, and the sea breeze from midday until near midnight. The climate both on the coast and in the interior is deadly to the white man, and though less fatal is still formidable to the black man born and reared in temperate regions. To the white man there is no acclimation in Liberia; the first attack of fever does not secure him from subsequent attacks. To the natives the climate is not unfavorable; they are robust and have few diseases, and many of them live to a great age. Iron ore abounds in Liberia, and copper and other metals exist in the interior of the country. The vegetables are almost endless in their variety. The most important of the native trees are rosewood, teak, mahogany, hickory, poplar, brimstone wood (so called from its yellow color), sassa wood, and many others valuable in ship-building and cabinet work. Camwood and other dyewoods, ebony, the acacia which yields gum-arabic, and the copal trees are found. There are several varieties of palm, all highly useful, especially the nut-bearing palm from which palm oil is made. Medicinal plants abound; among them are the copaiba tree, the *Croton tiglium*, which yields the croton oil, the castor oil plant, and the *Ricinus major*, whose seeds produce a highly purgative oil, and whose wood is much used for hedges and fences. Several varieties of maize and rice of excellent quality are cultivated, and on the highlands of the interior good crops of wheat, barley, and oats have been raised. Cotton flourishes, and sugar-cane and excellent coffee are easily produced. The esculent and farinaceous roots chiefly cultivated are the sweet potato, the cassava, the yam, the tenia, which in flavor resembles the potato, and the arrowroot. Cabbages, beans, peas, tomatoes, beets, cucumbers, and almost all the common garden vegetables known in America, thrive when planted in the proper season. The fruits are numerous and fine. Among them are the mango, lemon, lime, orange, guava, tamarind, pomegranate, cocoanut, plantain, banana, rose apple, African cherry, pineapple, avocado pear and the African peach. Wild animals are scarce, the elephant, hippopotamus, leopard, crocodile, boa constrictor, and deer, formerly abundant, being now rarely met with. Monkeys, guanas, chameleons, lizards, and ants in great

LIBERIUS — LIBERTY BELL

variety, abound in the forests. The driver ants, which travel from place to place in countless multitudes, are welcomed by the people, for when they enter a house they soon clear it of every other species of insect and vermin. The Liberians build coasting-vessels, and possess a number of large vessels trading with Great Britain and the United States. An export and import trade is carried on, and a large number of the inhabitants of the interior depend upon Liberia for their supplies of European goods. The more important articles of export are coffee, sugar, palm-oil and palm kernels, cocoa, arrowroot, caoutchouc, ivory, kola nuts etc. The total value of the trade, however, does not probably exceed \$2,500,000.

The population amounts to 2,060,000 of whom 60,000 are liberated American slaves and their descendants, the remainder indigenous negroes, including the Kroomen (q.v.). No white man is allowed to acquire citizen's rights or to hold property. There is no standing army, but all citizens capable of bearing arms are enrolled in the militia. Slavery is declared illegal. Complete religious toleration exists, the Methodist forms prevailing. English money is current, though accounts are kept in dollars and cents; and English weights and measures prevail. The financial condition of the republic has been deplorable; latterly there has been a change for the better. In 1893 the revenue derived chiefly from customs duties was \$185,345 while the expenditure mainly for administrative purposes was \$188,187, in 1900 the revenue was \$218,804, and expenditure \$207,935. The state debt contracted in 1871 amounted to \$500,000 at 7 per cent on which the unpaid interest alone in 1899 amounted to \$892,500. In that year an agreement was effected for the reduction of the rate of interest, the amortisation of the principal, and the payment of arrears; duties on rubber and other articles being assigned as security. In 1902, by this arrangement the debt amounted to \$391,250 and the arrears of interest to \$93,735. The arrears of interest on the internal debt, however, exceed the principal. The republic unfortunately is not in great favor with the native negroes, nor with those of the United States, although a few immigrants still arrive annually. Not only have the Liberians failed to make any impression on the aboriginal inhabitants, whom they were supposed to civilize, but, notwithstanding many honorable exceptions, they are lazy and quarrelsome, and unfortunately there is a general tendency in many respects to relapse into barbarism. About six square miles only of the territory is effectively administered. Consult, Blyden, 'A Chapter in the History of Liberia' (1892); Bourzeix, 'La République de Libéria' (1887); Büttikofer, 'Reisebilder aus Libéria' (1890); Delafosse, 'La République de Libéria' (1900); Durham, 'The Lone Star of Liberia' (1893).

Liberius, pope: b. Rome; d. there 24 Sept. 366. He was pope from 352 to 366; is one of the pontiffs that have incurred the accusation of heresy. It is conceded that he suffered an exile of two years by order of the Emperor Constantius for refusing to subscribe to a condemnation, by the Council of Arles (354), of the great champion of the Niceno-Constantinopolitan creed of the homoousion, St. Athanasius. But it is alleged that he obtained his recall by subscribing to a heretical, formally Arian con-

fession of faith drawn up by an assembly of bishops at Sirmium. As there were three councils of Sirmium and three Sirmian confessions, the question arises, what was the tenor of each, and which one was subscribed by Liberius. The first council was held in 351; its confession is orthodox in its terms, but it does not employ the orthodox shibboleth homoousion. The second was held in 357: its confession is emphatically Arian. The third confession is Semi-Arian and heretical: but as it was formulated in 358, after Liberius' return from exile, that could not be the confession signed by him. Did he sign the second? No; for St. Hilary (300-368) a principal authority for these transactions, states that the confession signed by Liberius was drawn up by 22 bishops, among them Demophilus; and Liberius himself says that it was formulated by eastern bishops and presented to him by Demophilus, one of them: the confession signed by Liberius must have been this first (and orthodox) Sirmian confession; for the second was the work of western bishops or approved by them—Valens, Ursacius, Hosius, Germinius and Potamius.

Libertad, lē-bēr-tād', Peru, a department bordering on the Pacific Ocean, with the departments of Lambayeque, and Cajamarca on the north, Loreto on the east, and Ancachs on the south. It is mountainous, with a narrow strip of level land along the coast. The Marañon, the head stream of the Amazon, waters its eastern slopes. Area, 10,206 square miles; pop. (1896) 250,931. Capital, Trujillo.

Lib'ertas, the goddess of freedom. By the Greeks she was invoked by the synonymous title Eleutheria. At Rome, her most famous temple was situated on the Aventine Mount. She was represented under the figure of a woman holding in one hand a cap, the symbol of liberty, and two poniards in the other. In ancient times Roman manumitted slaves put on what was termed the Phrygian cap, in token of their freedom. In modern times, a cap is also used as a symbol of liberty; thus, in France, a red cap formed the badge of the Jacobin Club. In England, a blue cap with a white border is used as a symbol of the constitutional freedom of the nation.

Lib'ertines, or **Liberti'ni**, a sect of fanatics in the 16th century in the Netherlands and Belgium, who maintained that nothing is sinful but to those who think it sinful, and that perfect innocence is to live without doubt. They advocated community of goods and gave themselves the name of "Spirituals." The name was also applied in England to the early Anabaptists about the middle of the 16th century.

Lib'erty, Mo., city, county-seat of Clay County; on the Hannibal & St. J. and the Chicago, M. & St. P. R.R.'s; about 15 miles, by rail, northeast of Kansas City. It is situated in an agricultural region, and its chief manufactures are flour and dairy products. Its trade is principally in grain, vegetables, fruit, and live-stock. It is the seat of the William Jewell College, opened in 1849 under the auspices of the Baptists, and of the Liberty Ladies' College opened in 1890. Pop. (1900) 2,407.

Liberty Bell, the bell which formerly hung in the dome of the old State House (Independence Hall), Philadelphia, and was rung

LIBERTY BOYS—LIBERTY, STATUE OF

to announce the signing of the Declaration of Independence, 4 July 1776. It was cast in England especially for the State House, and was brought from there in 1752; in being taken from the ship it met with an accident which spoiled its tone, and it was recast in Philadelphia in 1753, when the words "Proclaim liberty throughout all the land unto all the inhabitants thereof" were inscribed on it. When the British occupied Philadelphia, the bell was taken down and hidden in the Delaware River near Trenton, but was afterward hung in its old position, and for several years rung every Fourth. In 1835 it was broken while tolling for the death of Chief Justice Marshall. In 1834 it was placed in the hall of the old State House on a pedestal with 13 sides representing the number of original States. In 1893 it was carried to Chicago for the World's Fair, and in many cities through which it was carried was greeted with special demonstrations; and has since been specially exhibited in other cities. Consult: Belisle, "History of Independence Hall."

Liberty Boys, a popular name given the Sons of Liberty during the American Revolution.

Liberty College, a coeducational institution, founded at Glasgow, Ky., in 1875, under the auspices of the Baptist Church. In 1902, the number of instructors connected with the school was 11 and the number of pupils 250. The grounds and buildings were valued at \$25,000. The amounts received from tuitions and other fees were \$6,500.

Liberty, Equality, Fraternity, a well-known motto of the French Republic, dating from the time of the first revolution. Equality, in this connection, means equality before the law and the absence of class privileges. The motto gives title to a work by Sir J. F. Stephens (1873).

Liberty Party, the first political organization of the American Abolitionists (q.v.). The Anti-Slavery Society was composed of two wings steadily and at last decisively diverging: the politicals, who wished the work to be carried on as other reform measures are, by massing its supporters, and either winning a decisive victory or extorting gradual compromises from its opponents; and the Garrison wing, who refused to vote, hold office, or in any way recognize a government which legitimated slavery, denounced the Constitution, and denounced the churches and ministers for refusal to join the movement. The violence of this branch, and even more the revolutionary and sometimes offensive social theories associated with it, made the other anxious to part company; and they brought this about by having the annual report in 1838 suggest the nomination and support of abolitionist candidates. The next year, on the refusal of the Garrisonians to listen to this, the political wing split away, and in 1840 organized the "American and Foreign Anti-Slavery Society." Among the leaders of this secession were James G. Birney, Arthur Tappan, Gerrit Smith, J. G. Whittier, Edward Beecher, John Jay, and Thomas Morris. In a convention at Warsaw, N. Y., 13 Nov. 1839, this branch nominated Birney (a Kentucky ex-slaveholder) for President, and Francis J. Lemoyne for Vice-President. A national convention (mainly from New York) was held 1 April 1840, confirmed

these nominations, and took the name of the Liberty party. The nominees refused to accept, but were voted for none the less, and received 7,059 votes in the Harrison-Van Buren election of 1840, of which 2,798 were from New York State. During the next four years the party put up tickets in various local elections. On 30 Aug. 1844 it held another national convention at Buffalo. Polk was already nominated by the Democrats, on the issue of Texas annexation, which Clay had dodged and secured the nomination by the Whigs; but the Liberty Party had pronounced against all ostrich policies or candidates, and nominated Birney again, with Thomas Morris of Ohio as Vice-President. They received 62,300 votes, all in the North and Northwest, 15,812 in New York. Small as this vote was, it turned the scale in New York and Michigan against Clay, and elected Polk, the Southern Democrat; decided the annexation of Texas, and reinforced the slave party with new territory six times the size of New England. This result, however it might prove the potential power of the party, was not wholly satisfactory, and it was evident that a pure Abolitionist party was premature. The Abolitionists, therefore, dropped their separate organization, and in 1848 and 1852 voted for the candidates of the Free Soil Party (q.v.) accomplishing much more by strengthening the forces of this practical movement, whose enemies were constantly playing into their hands, than they could have done with the other. After the rise of the Republican party they formed part of its reliance and its advance guard, but always with a certain separation of feeling and even of organization.

Liberty, Statue of, the name of a colossal statue on Bedloe's Island in New York harbor. On 28 Oct. 1886, after more than 12 years of preparation, this statue, given by the people of France to the United States, was dedicated and unveiled. The statue was the conception of M. Bartholdi, who designed it for the Franco-American Union in 1874. It was built by popular subscriptions in France, and required over five years for its completion. It was mounted in Paris in October 1881. The American pedestal for the statue was not commenced till April 1883, and was finally finished in 1886. This was built by popular subscription. The statue was erected on an iron framework bolted firmly to the stone pedestal. The statue, which is of bronze, is of the following dimensions:

	Ft. In.
Water-level to top of pedestal.....	<u>.149</u> <u>10</u>
Statue proper to top of torch.....	<u>.151</u> <u>5</u>
Total height from water-level.....	.301
Heel to top of head.....	.112
Length of hand.....	.16
Index-finger .....	.8
Circumference at second joint.....	.7
Size of finger-nail.....	13 x 10 in.
Head from chin to cranium.....	.17
Head-thickness from ear to ear.....	.10
Distance between the eyes.....	.2
Length of nose.....	.4
Right arm, length.....	.42
Right arm, greatest thickness.....	.12
Thickness of waist.....	.35
Width of mouth.....	.3
Tablet, length .....	.23
Tablet, width .....	.13
Tablet, thickness .....	.2

The statue weighs 450,000 pounds, or 225 tons; the bronze alone weighs 200,000 pounds. Forty persons can stand comfortably in the

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head, and the torch will hold 12 people. The number of steps from the base of the foundation to the top of the torch is 403; from the ground to the top of the pedestal 195 steps. The number of steps in the statue from the pedestal to the head is 154, and the ladder leading up through the extended right arm to the torch has 54 rounds. The cost of the statue is estimated at \$250,000; the cost of the pedestal and the erection of the statue \$350,000; total cost of the work, completed \$600,000. The light in the torch at the top of the Statue of Liberty is maintained by the Lighthouse Service of the government. Liberty exceeds in height the Colossus of Rhodes which was said to have been about 105 feet high. That of Nero is said by Suetonius to have been 120 feet high. The statue of Charles Borromeo, which is still standing on the Lake of Geneva, is 66 feet high, and is mounted on a pedestal measuring 46 feet. The celebrated statue of Jupiter carved by Phidias is said to have been 60 feet in height.

Liberty Tree. (1) a famous ballad of the Revolutionary War, written by Thomas Paine in 1775. (2) An old elm tree in Boston upon which the citizens hanged in effigy British officials connected with the Stamp Act and its enforcement.

Libi-divi, lē'bē-dē'vē. See *Divi-divi*.

Libmanan, lib-mà-nan, or Libanan, lē-bà'nàn, Philippines, pueblo of the province of Ambos Camarines, Luzon, situated on the Polanluna River near its confluence with the Naga, 10 miles northwest of Nueva Cáceres. It is on the main road, and is a telegraph and military station. It has also important hemp and rice industries. Pop. 14,500.

Li'bra, (1) the ancient Roman pound weight, consisting of 12 ounces. (2) The original meaning is balance or pair of scales. (3) The seventh sign of the zodiac is called Libra, because at its first point the ecliptic crosses the equator to the southern hemisphere, and we have then the autumnal equinox, when day and night are, as it were, equally balanced.

Libraries, a general term used to designate collections of books and manuscripts for reading and preservation. The term library is also commonly applied to any apartment or building containing such a collection of books or manuscripts.

Libraries of the Ancients.—In early antiquity libraries consisted of archives, which were preserved in the sacred temples. The oldest library is said to have been founded in Memphis by the Egyptian king Osymandyas, of the 12th dynasty. It was housed in a division of the palace, at the entrance of which were inscribed the words: "The Healing of the Soul." It contained works of an unknown antiquity deemed sacred by the Egyptians, which were destroyed in the ravages attending and following the Persian invasion. The monumental cuneiform records of the ancient Assyrian, Babylonian, and Persian empires have been designated "public libraries in clay." The principal Hebrew library was in the temple at Jerusalem; it was restored after the captivity by Nehemiah, and again by Judas Maccabæus, and perished in the conquest by the Romans.

In Greece, Pisistratus was, according to Aulus Gellius, the first to establish a public library at Athens. It was taken to Persia by Xerxes, returned by Seleucus Nicator, pillaged by Sylla, and restored by Hadrian. Polycrates soon after founded a library in Samos, and large collections of books were made by Euclid, Euripides, and especially by Aristotle, whose library, after passing through two generations, was purchased by Ptolemy Philadelphus and transported to Alexandria. Of ancient libraries, the most celebrated was that at Alexandria, which at one time is said to have contained 700,000 volumes. (See *ALEXANDRIAN LIBRARY*.) The first library at Rome was that of Paulus Æmilius (167 B.C.), the booty of war in Macedonia. Libraries subsequently became common, and in the time of Augustus it was fashionable for men of culture to have one in their houses. Sylla took from Athens to Rome the library of Apellicon the Teian; Lucullus made a large collection, and his galleries and porticoes became a favorite resort for conversation; Varro, Atticus, and Cicero were enthusiastic collectors of books. One of the unfulfilled projects of Cæsar was the formation of a public library, which should contain all the works in Greek and Latin literature. Augustus established the Octavian and Palatine public libraries, the latter of which continued until the time of Pope Gregory I. More important was the Ulpian library, founded by Trajan. In the 4th century Publius Victor mentions 28 public libraries in Rome, beside many valuable private collections. All of these perished in the storms of barbarian invasion. The library of Constantinople, founded by Constantine, and enlarged by Julian and the younger Theodosius to the number of 120,000 volumes, was partially burned by the iconoclasts in the 8th century under Leo the Isaurian. Libraries were founded from the 9th to the 11th century, especially by the imperial family of the Comneni, in the cloisters on the islands of the archipelago and on Mount Athos. After the fall of the Byzantine empire the imperial library was preserved by the command of Mohammed II. in one of the apartments of the seraglio, and was either destroyed by Amurath IV. or perished by neglect. The Moslems had an important library of Arabic books in Alexandria, and one at Bagdad, which included Greek manuscripts.

Mediaeval Libraries—As early as the 12th century Spain had upward of 70 libraries, and no monastery was founded without a collection of books, sacred and secular. The Benedictines had celebrated collections at Monte Casino, Canterbury, York, Bobbio, and Corbei. There were others at Fulda, Hirschau, Tours, Saint Germain des Prés, and Saint Gall. The revival of classical learning gave a new impulse to the formation of libraries. The large universities, princely families and many private scholars were zealous collectors. With the invention of printing began a new era in library history, the number of books being greatly increased and the cost materially reduced. Several of the largest libraries in Europe date from this period. The suppression of the numerous cloisters caused many small libraries to be incorporated in the larger collections of universities and cities. (See *Book*.) Nicholas V. during this mediæval period founded the library at the Vatican. Among others early founded was the Bodleian at Ox-

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ford (1597); the University at Cambridge (1475); the University at Edinburgh (1580); the Imperial at Paris (1377); the Town at Strasbourg (1531); the Royal at Munich (1550); the Royal at Copenhagen (1550); the Laurentian at Florence (1444); the Saint Mark's at Venice (1468); the University at Turin (1436); and the Town at Brussels (1350).

Libraries in Great Britain.—In Great Britain the two largest libraries of modern times are the Bodleian in Oxford, so named after its founder, the diplomatist and scholar, Sir Thomas Bodley (1545–1613), and now containing probably about 570,000 volumes and 30,000 MSS.; and the library of the British Museum at London, now one of the first in the world, and containing probably more than 1,900,000 printed books and perhaps 100,000 MSS. and charters. The library of Cambridge university is estimated at over 500,000 books and 6,500 MSS. Perhaps the fourth library in Britain in point of value is the Advocates' Library in Edinburgh, with about 350,000 books. The four Scottish universities have collections respectively of from 100,000 to 180,000 volumes. The most valuable library in Ireland is that of Trinity College, Dublin, with 240,000 volumes. Important free libraries have been established at Liverpool, Manchester, Birmingham, and Hull, which have each a library of over 100,000 volumes. These free libraries were the result of a Free Library Law passed by Parliament in 1850.

Modern European Libraries.—The principal libraries of modern times on the European continent are: the national library at Paris, about 2,600,000 printed books and 102,000 MSS.; the royal library at Munich, about 1,000,000 books and 40,000 MSS.; the royal library at Berlin, about 1,000,000 books and 30,000 MSS.; the imperial library at Saint Petersburg, with a total number of volumes about 1,100,000 and 28,000 MSS.; the Strasbourg University and public library, 760,000 volumes; the imperial library at Vienna, with more than 500,000 books and 24,000 MSS., and the university library with 559,000 books; the university library at Göttingen, having 500,000 books; the royal library at Dresden, 500,000 printed books and over 6,000 MSS.; Hamburg city library, 600,000 books and 5,000 MSS.; Leipsic University library, 500,000 books and 5,000 MSS.; the royal library at Copenhagen, now said to have more than 500,000 books and 20,000 MSS.; the royal library in Stockholm and the library of the University of Upsala, in Sweden (280,000 to 300,000 each); the national library in Madrid, 500,000 volumes; the royal library at Brussels, more than 375,000 books and 27,000 MSS.; the royal library at Stuttgart, 432,000 volumes; the Vatican library at Rome, with printed volumes estimated at over 200,000, and 26,000 MSS. Besides the national library, there are in Paris those of the Arsenal (454,000 printed books, 6,000 MSS.), of Saint Geneviève, of the Institute, and the Mazarin library (300,000). In the rest of France there are over 270 public libraries, the principal of which are those of Lyons (160,000 volumes), Bordeaux (200,000), Aix (170,000), etc. Access to these great collections is easily obtained both by natives and foreigners. In Italy there are a great number of valuable libraries, of which the university library at Bologna is said to contain 255,000

volumes, 6,000 MSS.; the National Library at Florence, 450,000 volumes, 15,000 MSS.; besides the Laurentian library in the same city, consisting almost entirely of MSS.; the university library at Genoa, 120,000 volumes; the Ambrosian at Milan, about 170,000 printed volumes and about 8,400 MSS.; the national library in the same city containing about 230,000 volumes; that at Parma 200,000 volumes, that of Naples 357,000, and that of Saint Mark at Venice 403,000. The Victor Emmanuel Library at Rome, consisting of the old library of the Jesuits, augmented by the libraries of suppressed monasteries, has over 550,000 volumes; the Casanata library, also at Rome, is said to contain 160,000 volumes, the Biblioteca Angelica 150,000 volumes, the Barberini library 100,000. The French government in the 19th century established over 25,000 popular libraries in connection with primary schools.

Libraries in America.—Soon after the Puritans landed at Plymouth Rock they founded a college and with it a library. The Harvard College Library established in 1638 was followed by Yale and William and Mary in 1700. The Philadelphia Library was founded in 1731, that of the American Philosophical Society (q.v.) (1742); the Charleston, S. C., Library (1748); the Athenaeum at Providence (1753); the Society Library in New York (1754); New York Historical (1804); and the Boston Athenaeum (1804). In 1800 the Harvard College Library had only 12,000 volumes; the largest, the Philadelphia Library Company, after absorbing three similar libraries, had only 18,391; the New York Society Library had 5,000; Yale College had only 2,700; and the Charleston Society Library had reached 7,000. These were the giants; no other library had 2,500; not half a dozen had 1,000; the average was 500 volumes.

A new era in American library history began in 1833, when a Unitarian clergyman at Peterborough, N. H., founded a free circulating library by an appropriation that has been continued annually to this day. Thus America became the birthplace of the free library, for the leaders of the movement which resulted in the Free Library Law of 1850 in England have said that they derived the idea from this country. In 1847 another small town, Orange, Mass., opened a free library, and four years later Wayland, Mass., followed. Then came the passage of the acts by which New Hampshire in 1849, and Massachusetts in 1851, authorized any town to tax itself for a free public library. In 1835, a law of New York permitted each school district to tax itself \$20 to found, and \$10 a year to maintain, a free public library. But as the people would not tax themselves, the friends of the measure persuaded the Legislature in 1838 to appropriate \$55,000 a year to purchase the books. Fifteen years later the libraries had over 1,600,000 volumes, but they were very little used, except in the cities, and the system was an entire failure.

Meanwhile other great libraries were being established in the larger cities. The New York Mercantile was founded in 1820; the Astor (q.v.) in 1839, and the New York State at Albany in 1818. Others established were the State at Annapolis, Md. (1826); the State at Indianapolis (1825); the Boston Public, (1852); the Congressional, at Washington (1851), and

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the Smithsonian, at Washington (1849). Until 1876 these institutions and the smaller libraries worked along individual lines with no thought of organized effort, or of comparing views or adopting common plans for library improvement. But in 1876 the American Library Association was formed and the publication of the 'Library Journal' commenced. Since that date development in Library Science has been rapid, there being five divisions in which there has been the most progress — library establishment, the profession, the building, the management, and the methods of reaching the public. The trend of opinion has been toward libraries established by legislation, supported by taxation, helped as far as possible by private generosity, managed by their own authorities, free to all, the library of the people, by the people, for the people. To assist their establishment, 17 State library commissions were organized, the first in Massachusetts in 1890.

The gifts to libraries by private individuals between the years 1893 and 1903, originating, perhaps, in the persistent solicitation of college presidents, have been remarkably generous, the total amounting to many millions of dollars. Most of these donors, however, have preferred to give buildings and land rather than books, or funds for buying books. (See CARNEGIE, ANDREW.) The growth and development of the Boston and Chicago public libraries; the wonderful progress of the Congressional Library (q.v.) at Washington and the consolidation of the Astor (q.v.) and Lenox (q.v.) libraries and the Tilden Foundation into the great New York Public Library (q.v.), are the chief events in the library history of the present day.

Libraries, Traveling. See TRAVELING AND PICTURE LIBRARIES.

Library Administration. In recent years the conception of a library's field and functions has grown so rapidly that library administration has become a recognized science with problems vastly broader and deeper and demanding well equipped professional schools giving systematic instruction to those in whose charge the leading libraries will be placed.

This has greatly altered the librarian's status. Once he was little better than a head janitor whose functions were to keep the books clean and protected. Now the New York State library school, the first of its kind in the world, admits no candidate to its two years' course who is not a college graduate and in addition gives promise of more than ordinary success. In salaries, hours of service and vacations the librarian is rapidly winning his place beside other educational officers, as the public recognizes that in general education, professional training, executive capacity and all the factors which determine salary, the successful modern librarian takes full rank with the highest educational officer of the same community. The proper salary of a college librarian is now that of a full professor. In a university he ranks with deans of departments and in public libraries with superintendents of schools or high school principals. Usual daily hours are now 7 and usual vacation one month, with a growing tendency to allow a second month for illness or other absences, so that a librarian who has lost no time during the year will have two months for

a long summer vacation, or somewhat over half what is enjoyed by most teachers.

Functions.—The chief function of the old library was to get all the books it could and preserve them safely. The modern library does this also, but has placed free public use infinitely above getting and keeping. First the word library lost its etymologic meaning from the tree bark on which writing was done, and came to mean any collection of books. It is now rapidly losing that sense and means the community intellectual headquarters where are to be found not only books and pamphlets, but periodicals, newspapers, maps, pictures, coins, medals and collections illustrating science, history or art. It is no longer a reservoir whose chief function is to take in and accumulate, but a fountain. Its work is no longer passive, but aggressive. The modern librarian is as anxious to put his wares before the public and have his books and other material used as is the store or factory to secure custom for its goods.

We have learned that reading is the greatest engine human genius has evolved. It grows constantly in importance. While most reading is better than most conversation, it is as powerful for evil as good, so that the greatest problem for educators and statesmen is to develop in youth a taste for the best reading and to supply it free through life.

Reading has three great functions: (1) To inform, so that one may stand on the shoulders of all his predecessors and utilize their labors and experience in any subject. This cumulative wisdom of the race passed on in books makes possible the marvels of civilization. Books give this information which builds material prosperity. (2) A still more vital function, but less tangible, is the inspiration which lifts up and builds character, the work of the books of power, the books of all time. (3) The last great function is to afford rest and recreation for the tired and overworked to fit them better to carry life's burdens. The free public library has been found the only practicable method for shaping this reading, which in its threefold form of information, inspiration and recreation is the greatest influence in modern life.

Administration.—Books and other suitable material are no more a library than a pile of bricks is a building, or a mob of men is an army. To be effective there must be such arrangement and organization that its great functions can be performed promptly and efficiently without undue cost. Experience proves that the chief factors in a successful library are in order of importance: (1) Librarian; (2) books; (3) methods; (4) building. Because it is most prominent and readily understood by the inexperienced, the least important is usually thought of first.

Library Buildings.—To compete successfully with places of amusement the library should be as accessible as possible, but preferably a few steps off the main street for greater quiet. Books increase in a ratio beyond the plans of architects and librarians, and not one library in a hundred makes sufficient provision for growth, either for books, readers, or administration. Good natural light and ample room for growth are essential. Steel, glass and brick are the best materials for large libraries, but fireproof construction is im-

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portant only for central libraries which preserve rare books not readily obtainable in open market. The best books should be housed within easy walking distance of every citizen. This requires in larger towns branches or deliveries at convenient points. The most used books should be freely accessible in reading-rooms, but economy and convenience both demand that the main supply should be kept in stacks. The best standard type is made up of double-faced bookcases only 75 cm. apart, thus filling solidly with volumes all space not needed for access to them. Each case is eight shelves high and five tiers long, thus giving 80 shelves on its two faces. Each shelf is 75 cm. long, 20 cm. deep and 25.5 cm. high, thus taking all books up to the largest standard (8vo) which by library rules is limited to 25 cm. These cases make a one-story stack, with every book within reach of the hand without ladders. Wood is used for one or two stories, but steel is better for the taller stacks (sometimes 10 stories) and grows steadily in favor because it is strong, compact, fireproof and more open for light. The simplest satisfactory fireproof construction costs from 15 cents to 30 cents per volume of storage capacity. The plainest oak shelving can be built for about four cents a volume, while for temporary use the cheapest packing-boxes in four-shelf units 75 cm. long, each holding 100 volumes, can be made for 50 cents, the cheapest possible temporary storage.

Hot water heat is best. The boiler costs the same as steam, piping and radiation about 25 per cent more, fuel a trifle less. But steam is a less pleasant heat and is very apt to crack and annoy readers.

Artificial light should be provided on all reading-tables. High lights are bad for the eyes and unnecessary except for occasional illuminations. Acetylene gives a more perfect light, but the convenience of carrying flexible wires and turning on and off with a touch makes electricity almost the universal light where current can be bought cheaply. The stack section of the building should be of glass with only steel or masonry enough for support, with glass always opposite aisles.

Spiral stairs are costly, wasteful and inconvenient. Straight stairs under which space can be used for shelves take less space. Doors to bookcases are worse than useless and have been abandoned except for rare, costly or restricted books. Tables and desks should be 78 cm. high, not 75 cm. as usual; for short people can use higher chairs, but tall people cannot shorten their legs. Skilful arrangement of rooms will greatly reduce cost of administration. Permanent partitions should be used only where necessary for support. Temporary partitions, usually glass, can be readily moved as growth requires. These allow better light and supervision from another room, while shutting off noise, and give a more spacious look. Most important after the central rooms are: first a quiet study room, then a children's room. Even small libraries need one or more class or lecture rooms for clubs, classes and meetings which find their natural home at the library. Larger libraries require a growing number of special rooms for newspapers, art, patents and various other needs of the staff and public.

Selection of Books.—Counting only the

prominent nations, a new book is published every five minutes to swell the millions previously printed. Unbound books or pamphlets are almost beyond number. Besides the almost incredible number of daily, weekly, monthly and other periodicals, there are as many more institutions and societies constantly publishing papers, transactions and reports. Large libraries must make a liberal selection from these, complete, bind and preserve them for the use of posterity. The New York State Library alone receives 12,800 of these sequents. As every library is limited for money and space, it is a grave problem just what to buy and, except in cyclopedic libraries that take everything, what to accept as gifts. The need of printed guides has been partly met by bibliographies, catalogues and lists to help determine quickly what is best to buy, its cost, where and by whom published, and perhaps to track it through auctions and stores. Many think of these bibliographies as constituting a dozen or so reference books, but a reasonably complete collection numbers over 20,000 volumes and is growing as rapidly as other subjects. It is one great factor in the professional training of a librarian to learn how to use this extensive apparatus successfully.

Accessions.—After a book is selected, it must be made part of the completely organized library which has as its ideal the choice and delivery to each inquirer, with the least possible delay, of the book, pamphlet, article, essay or other item which then, there and to him will be most useful. This is a most difficult problem even in a small library, and in large ones with a million or more items from which to choose, no satisfactory results can be reached without an elaborately organized system, administered as carefully as are the details of a great factory or railway, where mistakes and carelessness are intolerable. There are 30 distinct steps in the accession department routine alone of a large library before a book is ready to be classified or catalogued. Economists have repeatedly tried to shorten the processes, but after a few years experience have been forced to incur the extra cost of going back and supplying omissions as the only way to avoid a more serious expense in the delays of hourly service to readers. Ownership is marked by a bookplate inside the front cover with name of library and official marks. The name is also repeated (stamped, embossed or preferably perforated) on the title-page so that it cannot be removed by book thieves, and most libraries have private marks at some special page, to be found only by one knowing the key, as a means of identifying lost or stolen books. Book numbers gilded on the back insure quick finding and replacing on shelves, and lending libraries usually put a manila pocket inside the back cover to carry the book or reader's card. The accession book is the business record. Every volume has a line across the two pages as its pigeonhole for its complete history. The columns are: number (in order of receipt), class number (showing subject), book number (showing place in that subject), volume number (if more than one), author, title, place and publisher, year when published, number of pages, size, binding, source (name of giver or seller), cost, with a final wide column for remarks on the book's history, for example, lost, worn out, sold, or withdrawn.

LIBRARY ADMINISTRATION

The accession number is stamped on first recto after title, on shelf list and cards, and exactly identifies that particular volume.

The shelf list is an inventory or brief list of all the library contains by subjects, and is usually kept on sheets laced in a binder, one sheet to each subject. Besides class, book, accession and volume numbers, it gives merely author and short title. It is used to take the annual inventory and is also a convenient form of subject catalogue, though it gives no cross references.

Author Catalogue.—This like all other catalogues and indexes is kept on cards 7.5 cm. high and 12.5 cm. long, the size adopted for national and international use and rapidly displacing all other sizes except for peculiar uses. (See LITERARY LABOR SAVERS, *Card Index System*.) The author catalogue gives under each name all of any author's work which the library has, without including any done by some one with the same initials or full name, thus confusing identity. This author catalogue is often expanded to include striking titles of anonymous books, names of subjects of biographies, criticisms and reviews, or any topic for which the subject entry would be the name of a person or place. It is then called the "name" catalogue.

Subject Catalogue.—This shows what the library contains on any given subjects. For lack of time or money it records in many libraries only books, but a complete catalogue would add pamphlets, articles in periodicals, papers, transactions, essays and collected works, maps and whatever material one studying that topic might want. The Decimal classification, now generally used by libraries, has over 20,000 subject headings and many new ones are added yearly. By means of its very full and simple index, any one who knows what a book is about may readily classify it minutely; the youngest assistant knowing clearly what subject he seeks may find it with equal ease.

The most common form of catalogue extends the name list to include any subject on which the library has a book. A catalogue with authors, titles and subjects in a single alphabet, with cross references from various synonyms so that one consults it like a dictionary, is called a dictionary catalogue. The author catalogue corresponds to the personal list in a directory; the classed catalogue to the business section showing who is engaged in each specific line of business. A dictionary catalogue requires the least explanation and is most popular, but it is more difficult to make well, and except at prohibitive cost cannot give intelligent investigators as clear and methodic exhibits of a library's resources as may be found in the best classed catalogues. Larger libraries have many special catalogues, bibliographies and indexes as keys to their own special collections.

Annotation or evaluation is a most important factor in modern cataloguing. Its purpose is to tell in fewest words what readers are most likely to wish to know about a book as to its scope, treatment and value. The American Library Association publishing board, to which Andrew Carnegie recently made a first gift of \$100,000, is publishing numerous lists on this plan. The New York State Library is preparing with the co-operation of nearly 300 prominent librarians and specialists the annotated A. L. A.

catalogue which the national library will publish for the St. Louis exposition of 1904. New editions constantly revised and with more notes will follow, so that both librarians and readers will have a guide to 8,000 or 10,000 of such of the best books still in print as would be selected as a model library for a small town.

Lending.—A loan system must give the quickest possible service consistent with accurate and complete records. In America the card system is found better than the indicators so largely used in England. The librarian must know where every book is, when it should be returned and must be able to find daily those that are delinquent. Extra privileges in number of books or time retained are given to scholars having special claim, and many libraries allow two books instead of one provided that only one is fiction. Inter-library loans are frequent so that a reader in one library may, when necessary, secure a book to be found only in some other.

Libraries grow more liberal in privileges to readers who now find a large number of the most used books on open shelves instead of having to ask for each book consulted. In many libraries not only so called reference books but thousands of other volumes are thus thrown open to the public. Losses are not large compared with benefits, and the system grows in favor. The recently novel information bureau or reference desk in charge of an expert librarian whose sole function is to answer readers' questions has become a common feature, while the larger libraries are establishing a library faculty, each member taking some special subject on which he will be a recognized authority. Special rooms are set apart for important subjects, each in charge of a specialist. Even the smallest libraries are providing a children's room with low chairs and tables and a sympathetic librarian devoted wholly to their interests. Experience proves that time and money yield larger returns when spent on children than on adults. The children's room becomes the best possible training school for supplying readers who will use the library properly. Rooms for women's exclusive use are little used, women apparently seeing no more occasion for separate provision than in churches, lecture halls or theatres.

Support of libraries by fees is giving way to support by taxation, as a fee is prohibitive to many, and communities are coming to recognize that it is as much for their interests to have the "people's university" as the public schools free to all. Hours of opening have been lengthened from two or three a day till the larger libraries usually open from 8 A.M. to 10 P.M. and no longer close for evenings, holidays, vacations or the annual inventory of books. Sunday opening has proved unexpectedly successful. The theory of the modern library is to be available to readers at any time when they are inclined to use its privileges.

Paid Help.—A highly appreciated accommodation, offered by the New York State and some other libraries, is assistance of an extent or nature not properly provided at public charge, for mere cost of the time spent, estimated at the rate of annual salary. This saves people at a distance costly journeys, because an expert trained in a given library can often find as

LIBRARY BUILDINGS—LIBRARY SCHOOLS

much in an hour as the reader himself would find in a whole day. The telegraph or long distance telephone makes the central cyclopædic libraries quickly available for large areas, and editors, lawyers and others whose time is specially valuable may get needed information, and if wished translations, verified copies or any library service needed quickly at the trifling cost of the time of the lowest salaried assistant competent to do the work.

Bibliography.—Cutter, ‘Rules for Dictionary Catalogue’; ‘Expansive Classification’ (1904); Dana, ‘Library Primer’ (1899); Dewey, ‘Decimal Classification and Relative Index’; ‘Library School Rules’; ‘Card Catalog Rules’; ‘Shelf List Rules’; ‘Accession Rules’ (1894); ‘American Library Association Papers’ (1896); Plummer, ‘Hints to Small Libraries’ (1898); Richardson, ‘Classification, Theoretical and Practical’ (1901); Spofford, ‘Books for all Readers’ (1900); also ‘The Library Journal,’ New York (monthly); ‘Library Notes,’ Chicago (monthly); ‘Public Libraries,’ Boston (monthly).

MELVIL DEWEY,
Director New York State Library.

Library Buildings. See LIBRARY ADMINISTRATION.

Library Schools. With the advance of the free library movement and the growing complexity of the functions and organization of the modern library, the need has been increasingly felt for specially trained librarians. The first library school was organized in 1887 as a department of the work of Columbia College, under the charge of Melvil Dewey, and has since become the New York State Library School. At that time the course consisted almost entirely of instruction in the more technical work of library administration, but since then the ideals and scope of library schools have broadened, and they aim to give their students not only technical courses, but such courses as will enable them to deal with the public successfully, and become a real educational force in the community where they may be placed. The course in library schools usually includes cataloguing, bibliography, shelf-listing and accession work, library building, instruction in printing and book-making, reference and loan work, and general library economy; some schools provide, in addition, courses in history of libraries, and “selection of books”—that is, the critical study of books with a view to determining their fitness for use in different kinds of libraries and with different types of readers. As there are few text-books, the instruction is mostly by lectures and the students’ working out problems, preparing sample catalogues, accession books, etc.; all the schools have also some provision for actual work in a library. Instruction is given in different systems of cataloguing, loaning of books, and other technical work, and both the more complex systems suited for large libraries, and the more simple systems for small libraries are taught; sample blanks, forms, and fittings for all departments are used to illustrate the different methods.

Individual Schools.—The first library school was the New York State Library School, founded as has already been mentioned in connection with Columbia College (now Columbia University). In 1889 when Mr. Dewey, its director,

was appointed State librarian, the school was moved to Albany and became a part of the University of the State of New York. Its curriculum has gradually been enlarged, and its entrance requirements raised until in 1903 it was decided to require a full college course for entrance to the school; the degree of B. L. S. (bachelor of library science), which was at one time given only to those who had attained a certain rank throughout the course, is now given to all graduates who do the full work of the school; a carefully prepared bibliography or reading list on some approved subject is required, in addition to the class and practice work, for this degree. The practice work is provided for in the State library, and the traveling library and home education department. The Pratt Institute Library School was opened in 1890; entrance is by examination only; the main course is for one year, but a second independent course of one year is given in advanced work; separate certificates are given to show completion of work in each course; and those students who complete the two years’ work can take the diploma of the Institute by passing the Institute’s normal examinations. Practice work is required in the Institute library, and may also be had in various settlement libraries and home library work; in 1903 the experiment was tried of having the incoming class do two weeks’ practice work in the library before the regular instruction was begun; this proved successful and will be continued. The Drexel Institute Library School was opened in 1892; entrance to this school is by examination, and a certificate is given on completion of the course. The Illinois State Library School was opened in 1893 at the Armour Institute of Technology, and in 1897 became a part of the State University. The library course proper is two years, before which three years’ collegiate work is required; previous to 1903 only two years’ collegiate work was required. For the completion of the three years’ collegiate and two years’ library work, the degree of B. L. S. is given; for three years’ collegiate and one year’s library work, the degree of A. B. in library science. In addition to the regular library school courses, a special course in the care of public documents is given. Practice work is provided for in the University Library, and in the Champaign Public Library, a branch of the latter being entirely under the charge of the students of the library school. Since the establishment of these four more important schools, library school departments have been added to several universities and colleges. Among these are Department in Library Science in Chicago University, the course in Library Economics in Syracuse University, the School of Library Science in Columbian University, Washington, and the course in Library Science of Simmons College, Boston. Of these the Chicago department requires two years of college work for entrance; Syracuse admits on high school diploma. The Simmons College course (started in 1902) extends over two years, the library school work being done in connection with work in other departments of the college; a third year of advanced work is given to those who have completed their college work and can give their full time to the technical library work. The college library is under the charge of the library school students.

LIBRARY OF CONGRESS — LICH OWL

One other school, devoted to a special line of work, should be mentioned, the Training School for Children's Librarians at the Carnegie Library of Pittsburg. This was started in 1900 as a training class of the library; entrance is by examination or by college diploma, and a certificate is given at the completion of the work. One half the time is given to practice work in the children's room of the library.

Summer Schools.—A number of library summer schools have been organized, mainly with the idea of giving training to those who already hold library positions, or have been appointed to such positions. The instruction is, of course, not so thorough as in the regular library school, but is entirely practical; the courses usually cover the whole range of library science in a general way, and in most summer schools special courses are also given in one or two technical subjects. Among these schools are the Amherst summer school, the Chautauqua school, the New York State Library summer school, the summer library courses of the universities of Missouri and Wisconsin, and the summer schools under the charge of the State library commissions of Indiana, Iowa, and Minnesota.

Besides these schools, many libraries have apprentice classes, designed mainly for instructing and training assistants for such libraries; but a general letter of recommendation to all libraries is in many cases given the graduates of these apprentice classes. Of the larger libraries to have such classes are the public libraries of Providence, R. I., Brooklyn, New York City, Madison, Wis., and Nashville, Tenn. Lately also several colleges have introduced courses in bibliography and the history of printing, and some normal schools have similar courses, including something also of general library economy. This is not with the purpose of training the students to become librarians, but with the idea of enabling them to make the best use of the resources of the library, and, in the case of normal graduates, to enable them to organize school libraries and co-operate intelligently with the public library work.

Consult: The catalogues and reports of the individual schools; 'The Library Journal,' for July, 1898 (Conference number), and for July, 1903 (Conference number).

A. M. BURNHAM, A. B.

Editorial Staff, 'Encyclopedia Americana.'

Library of Congress, The. See CONGRESS, LIBRARY OF, WASHINGTON, D. C.

Libration, in astronomy, an apparent oscillatory motion of the moon, which causes parts near the edge to appear and disappear from time to time. It was discovered by Galileo. If the moon moved round the earth with a uniform angular velocity equal to its angular velocity of rotation on its axis, and if its axis were at right angles to its orbit, the same side of it would always be presented to the earth, and we should see only one-half of its surface; its libration enables us to see about 4-7ths of its surface. The moon's orbital angular velocity is sometimes slightly greater and sometimes slightly less than its axial angular velocity, hence equatorial parts of the moon near the edge are sometimes visible and sometimes out of sight. There is also a very small diurnal libration due to the motion of an observer on the earth.

Libri Caroli'ni. See CAROLINE BOOKS.

Libri-Carrucci della Sommaia, Guillaume

Brutus Icile Timoléon, gē-yōm broo-tüs ē-sēl tē-mō-lā-ōn lē-brē kā-roo'chē dē'lā sōm-mä'-yā, COUNT, French mathematician: b. Florence, Italy, 2 Jan. 1803; d. near Fiesole, Italy, 28 Sept. 1869. His father was an Italian adventurer, in 1816 condemned at Lyons to ten years' imprisonment at hard labor and to branding for counterfeiting goods, and who finally became a secret agent of the king of the Netherlands. The son became professor at the University of Pisa, where he published in the scientific journals several articles on the theory of numbers, on analysis, and the resolution of indeterminate equations of the first degree. Having been compromised by his political views, he fled in 1830 to France, where the friendship of Arago introduced him to the world of science. Naturalized in 1833 as a Frenchman he was called to the Academy of Sciences as successor of Legendre. He became inspector-general of public instruction, obtained the cross of the Legion of Honor, and was appointed inspector-general of the libraries of France, an office created expressly for him. Several works published by him during this period gave him a widely extended reputation. Among these were 'Histoire des Sciences Mathématiques en Italie depuis la Renaissance jusqu'à la Fin du 17e Siècle' (1838-41); 'Souvenirs de la Jeunesse de Napoléon' (1842); and 'Lettres sur le Clergé et la Liberté de l'Enseignement' (1844). During the latter part of the reign of Louis Philippe, he was suspected of having made use of his office of inspector-general of libraries to plunder them extensively. After the minutest investigation, Libri, who had escaped to London, was found guilty and condemned in June 1850, to ten years' imprisonment and degradation from public employment. A remarkable paper was written on his behalf by Paul Mérimée entitled 'Le procès Libri,' and published in 1852 in the 'Revue des Deux Mondes.'

Liburnia, li-bér'ni-a, in ancient geography, a district of Illyricum along the coast of the Adriatic, now included partly in Croatia and partly in Dalmatia. The country is mountainous, and the inhabitants were celebrated from early times as sailors. They occupied the northern islands of the Adriatic, and had settlements on the Italian coast. Their chief towns were Scardona and Iader.

Libya, lib'i-a, the geographical term of the ancients for Africa. At first it had mythical boundaries. Though Herodotus seems to have known that Africa was a peninsula, the moderns knew little about this till the Portuguese doubled the Cape of Good Hope in 1497. Homer and Hesiod comprised under Libya all the territory west of Middle and Lower Egypt. The Macedonian kings of Egypt, on the development of commerce, necessarily acquired a more exact knowledge and the wars of Rome with Carthage first gave men accurate knowledge of the interior. The sandy tract in which the Sahara is included was called the Libyan Desert and that portion of the Mediterranean extending between the coast of Africa and Crete was known as the Libyan Sea. See AFRICA.

Lich Owl, or Litch Owl (Germ. *leich*, a corpse, O. E. *lich* or *lych*, dead), a provincial British name for any owl, which screams at

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night, and is superstitiously regarded as portending death. From the earliest ages the hoot of the owl has been regarded as ominous. Ovid, Virgil, and Shakespeare contain many illustrations of this common superstition. See LYCH-GATE.

Lichens, li-kĕnz or lich'ĕnz (Lat. *lichen*, Gr. λειχήν), a large but artificial group of the higher fungi (*Carpophyta*), characterized by parasitic growth upon the lower blue-green and yellow-green algae (*Protophyta*, *Chlorophyceæ*). Lichens are of the widest occurrence in nature, appearing as gray, yellow, and brown crusts or masses almost everywhere upon trees, rocks and soil. The number of genera and species differs more or less with the authority cited: the valid genera number not far from 250, while the species are in the neighborhood of 4,000.

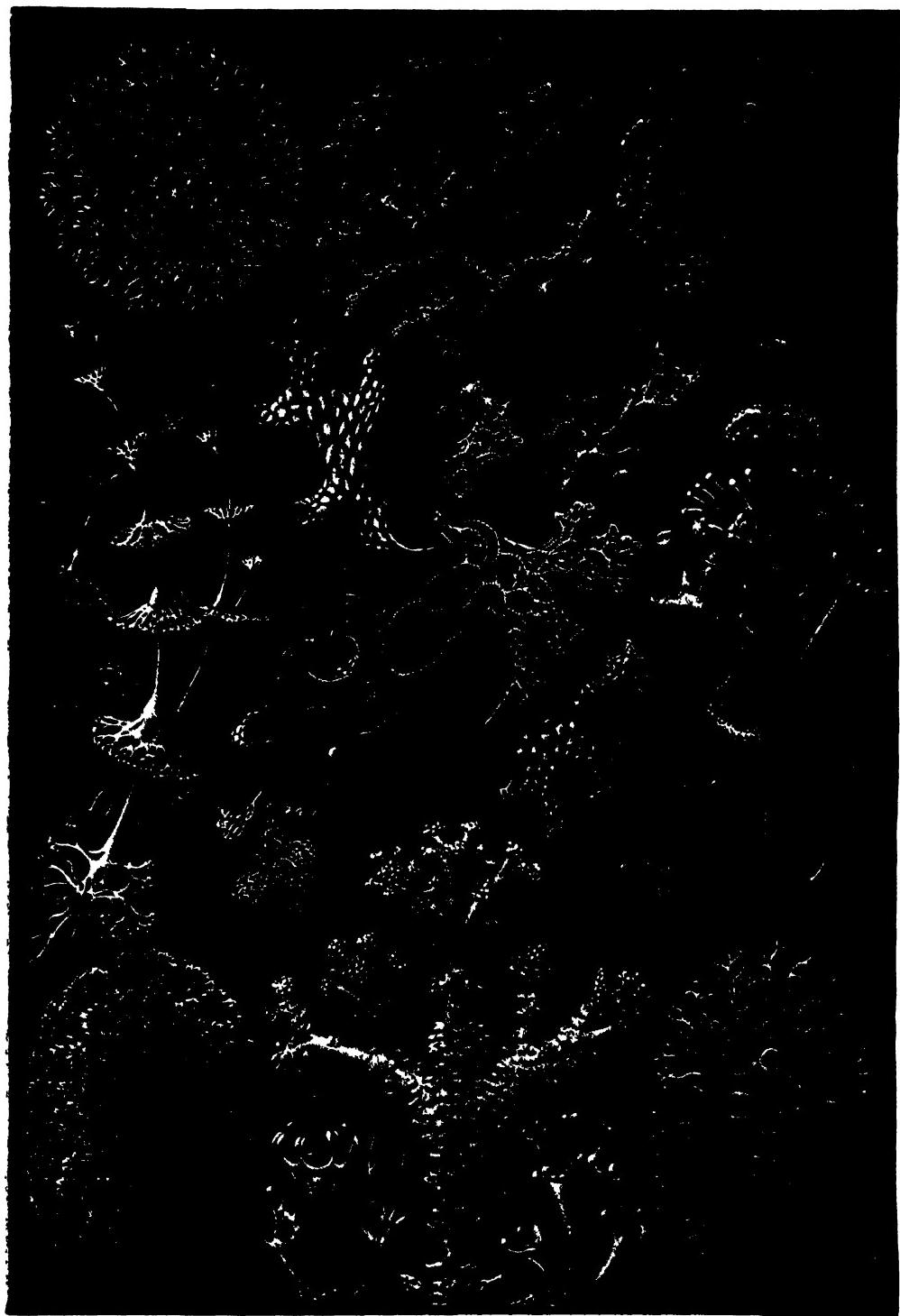
The vegetative body or thallus varies from a fraction of a millimetre to several decimetres in size, though it shows relatively little variation in thickness. In texture it is powdery, leathery, paper-like, or, in the case of many forms with blue-green algae, gelatinous: the prevailing colors are gray, brown and yellow, while green and black sometimes occur. The shape of the thallus is typically orbicular or stellate; it is often irregular, especially in branched forms. In general appearance, the thallus varies within wide limits; as a rule, however, three types, crustose, foliose and fruticose, may be clearly distinguished. The crustose type is the primitive one, showing in its granular, warty, and areolate forms the various stages through which the thallus has passed in its development from the original mycelium. The crustose thallus is so closely in contact with its substratum that it cannot be separated from it without tearing. The foliose type is a higher development of the crustose. It is usually a definite, leaf-like structure, more or less lobed at the margin and attached to the stratum somewhat loosely or at but a single point. The fruticose type is a special modification of the foliose, in which the latter is more or less flattened or cylindrical and erect or pendulous. This form is probably an adjustment to conditions of diffuse light. It is especially characteristic of tree-lichens, and of certain ground forms, such as *Cladonia*, where it is termed the podetium. In the latter, there is also developed an accessory or secondary thallus, consisting of minute, leaf-like scales.

The simplest thallus consists merely of a few fungus threads enclosing the irregularly disposed cells of the host or alga. Ordinarily, however, the algal cells not only have a definite position, but the fungal portion of the thallus is likewise highly specialized. Naturally, this differentiation is least in the crustose forms and greatest in the fruticose ones. The structure of the foliose type may be taken as fairly representative, except of the gelatinous lichens, in which the algae are scattered throughout the thallus. A definite epidermal layer is wanting except in a few of the higher lichens, where the outer filaments have been gelatinized, resulting in the formation of a structure closely resembling a cuticle. As a rule, however, the uppermost part of the thallus is the cortical layer. This consists of hyphae (filaments) compacted in

such a way as to produce a tissue which looks much like parenchyma and is called in consequence, pseudoparenchyma. The function of the cortical layer is in part mechanical or supportive and in part protective. Its structure seems to depend primarily upon the latter function: it is least in those forms growing in forests, and greatest in those found in the open. Below the cortical layer and continuous with it is found the host or algal layer, consisting of filaments more or less loosely intertwined with the algae. This is the nutritive layer, in which the fungal hyphae draw their nourishment from the host-cells. The connection between the two may be merely by contact or by penetration. In the latter case the fungal hyphae either penetrate the protoplasm of the host and finally destroy it, or merely pierce the cell-membrane and lie in contact with the protoplasm. In either event, the hyphae develop special branches for contact or penetration, which are called haustoria. The algal layer is a specialized portion of the medulla which lies just below it. The hyphae of the two layers are continuous, but they do not develop haustoria in the medulla, where they tend also to run more or less parallel with the direction of growth. The medullary layer primarily serves the function of transport; it is likewise used for the storage of lichenin (lichen-starch) and fats. The lower surface of the thallus is covered with a cortical layer similar in structure to that of the upper surface. Generally, however, it is somewhat thinner and is designed rather for absorption than for protection. It is frequently produced into fascicles of hyphae termed rhizoids and cilia.

The thallus of many lichens exhibits several peculiar structures, which are the direct result of the symbiosis of fungus and alga. The most frequent and most important of these is the soredium. This is a minute irregular mass of fungal hyphae and algal cells, readily carried by wind or water, and able to grow directly into a lichen thallus under the proper conditions of moisture and warmth. Soredia occur upon the upper face of the thallus of many lichens as elevated powdery masses or tubercles. They arise in the algal layer of the thallus by the repeated branching of a fungal filament in such fashion as to completely enclose one or more cells of the alga, which also increase in number. The hyphae become more or less gelatinized and compacted into a surface very resistant to desiccation. The soredia are pushed upward through the thallus by the growth of the filaments below, and are finally extruded through a rift in the cortical layer, constituting a sorus. Normally, the soredia are carried away from the sorus and develop independently, but in some cases they grow while still in contact with the mother-thallus, producing minute, leaf-like scales upon the latter. These are the so-called isidiod growths or phylloclades, found in *Usnea* and related genera. Soralia are structures which arise from the medulla or even from the lowermost layer by the upgrowth of a mass of parallel filaments which penetrate the algal layer and there develop into normal soredia. Cephalodia bear the general appearance of soredia, but in origin and function they are quite different. They are distinguished as external, and internal. The cause of their development is unknown:

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1. *Parmelia stellaris*.
2. *Cladonia retipora*.
3. *Parmelia olivacea*.
4. *Cladonia perfoliata*.

5. *Sticta pulmonaria*.
6. *Cladonia verticillata*.
7. *Parmelia caperata*.

8. *Cladonia squamosa* (center), *C. fimbriata* (left), *C. cornucopiæ* (right)
9. *Hagenia crinalis*.

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they are said to arise from the soredia of other lichens, which have lodged upon the thallus. They have never been produced experimentally, however, and it seems much more probable that they are modifications of the thallus due to a change in the life form of the algal element. The cyphellæ are flat or concave gaps in the lower cortical layer of the thallus of *Sticta* and *Stictina*. They are filled with variously branched hyphae of the medullary layer and probably function as organs of absorption and respiration. The spermagonia are minute black dots occurring on the upper face of many lichens, especially near the margin of the thallus. Structurally they are identical with those propagative organs of black fungi that are termed pycnidia. They are spherical bodies with a membranous or carbonaceous envelope, containing a layer of rod-like filaments which bear at their tips tiny spore-like bodies called spermatia. As the names indicate, the spermagonia were supposed to be male reproductive organs, and the spermatia the fertilizing cells. There now seems to be little doubt, however, that they are propagative organs or pycnidia inherited from fungus ancestors. In a few cases they may be pycnidial parasites, such as *Phyllosticta*.

The fruit (sporocarp) of those lichens which bear spore-sacs (ascolichens) is called a peritheium when the fungus is one of the black fungi (*Pyrenomyctcales*), a hysterothecium, when it belongs to the cleft fungi (*Hysteriales*), and an apothecium when the lichen is a cup fungus (*Discomyctcales*). All these agree essentially in structure, though they differ in form: the peritheium is globoid, opening by a minute pore at the top, the hysterothecium, linear or irregular, opening by a cleft, and the apothecium usually open and disk-shaped. The essential parts in each are the same, namely; spore-sacs (asci), the spores, and the sterile threads (paraphyses). The apothecium is the highest type of spore-fruit and the most widely distributed. It consists usually of the following parts: the thecium, the central portion consisting of the asci, sometimes called thekæ, and the paraphyses; the epithecium, which lies above the asci; and the hypothecium which is found below them. The latter often extends around the sides of the thecium also, and is there termed the excipie (proper excipie, parathecium). All of these consist of densely compacted elongate hyphae (prosenchyma) which are without algae and are often more or less dark colored. In most of the higher lichens, the excipie is surrounded by the tissue of the algal layer, producing a thalline margin (thalline excipie) about the apothecium. The apothecium usually sits directly upon the thallus; occasionally it is stalked, and less frequently it is immersed or innate. Lichens show the same differences with respect to paraphyses, asci and spores that are to be found among the other cup-fungi and black fungi. The paraphyses are simple or repeatedly branched, continuous or septate, gelatinized or non-gelatinized, persistent or evanescent. They are often compacted and dark-colored at the tip, appearing to be continuous with the epithecium. The spore-sacs of lichens are cylindrical or clavate in form, more rarely obovoid. Their walls are thin, though sometimes gelatinized; they do not react to iodine as a rule, except when very young. The ascii

usually open by a terminal slit; in a few cases the entire wall breaks away. The number of spores in an ascus varies from one (*Pertusaria*) to many (*Acarospora*); the normal number is eight, six or four. The arrangement of the spores is usually irregular, though they are sometimes in one row (monostichous), or in two rows (distichous). Lichen spores are ordinarily colorless and simple, less frequently dark brown and many-celled. They may be two-celled (bilocular), several-celled (plurilocular), or muriform, when the partitions run in both directions. The wall of the spore is smooth and without appendages; the contents may be hyaline, granular or guttulate.

Physiology and Reproduction.—The functions of lichens are essentially those involved in the relation between parasite and host, modified to an important degree in those forms with well-developed thallus. Absorption of water takes place readily upon both surfaces of the thallus, but especially on the under side, where hyphae, cilia and rhizoids all act more or less efficiently as absorptive agents. According to Zukal, the hyphal hairs are capable also of absorbing moisture directly from the air, in *Physcia*, *Peltigera*, *Sticta*, etc. Water-storage takes place in the algal and medullary layers. It is effected primarily by the algal membranes, especially of the blue-green slimes, and to a degree also by the lichenin of the hyphae. Zukal has suggested that the cephalodia, because of their blue-green algae, are probably to be regarded as structures for the storage of water. The ability of the lichen thallus to retain water arises from its complexity, and from the presence of the gelatinized cortex. Lichens exhibit a number of somewhat primitive devices for the exchange of gases. These are often mere rifts in the thallus, or degenerate pycnidia; sometimes definite openings are present, or absorption takes place through loose protuberances. A specialized organ for this purpose is found in the cyphellæ of *Sticta* and *Stictina*, which are primitive breathing pores, making direct connection between the air and the medullary layer. The latter serves as a pathway for the transport of water and gases to the various parts of the thallus.

The relation of the lichen thallus to the environment is obscure. Of all macroscopic plants, lichens resist drying-out the most successfully. With respect to the temperature extremes which they can endure, they are surpassed only by the bacteria. Many lichens withstand temperatures greater than 65° C., and nearly all are able to resist the intense cold of arctic and alpine winters, with minima of -40° to -60° C. Lichens exhibit very different sensibility to light: the majority of them grow in the fullest sunlight, while some, *Evernia*, *Usnea*, *Peltigera*, *Graphis*, etc., are adapted to more or less intense shade. In alpine regions especially, orange and yellow thalli occur almost exclusively on the under, or shaded, side of rocks. This fact is explained by Zukal's researches, in which he found that the algal layer was most highly developed under a cortex orange or yellow in color, these colors being most penetrable by the rays active in carbon assimilation. The color of the cortex is also thought to be a protection against excessive illumination, though this explanation can scarcely hold for those

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lichens in which the lower cortex is highly colored. According to Schwendener, the growth of the thallus is largely intercalary, marginal or apical growth being relatively insignificant. In lichens with yellow-green algae, the growth of the thallus is determined by the fungus, and the development of the algal layer takes place subsequently. In this process, the algae and hyphae show a tendency to aggregate into tubercles, which modify the surface of the thallus. Somewhat similar sculpturings are produced by tensions in the growing thallus, especially by the alternation of wet and dry periods. In nearly all of the gelatinous lichens, and particularly those parasitic on filamentous algae, growth is controlled by the alga, and the fungus has little or no influence upon it.

The propagation of lichens occurs ordinarily by means of soredia. It may take place also by fragments of the thallus, whether abstracted naturally or cut off by accident. The propagative value of the pycnidium (spermogonium) in nature is unknown. The conidia have been germinated in cultures with difficulty, and at present there is no evidence that they grow more readily under normal conditions. Reproduction is a characteristic feature of the lichens: a few species produce apothecia rarely, while in certain sterile forms they are never developed. It is still an open question whether the apothecium is the result of fertilization. Some investigators have thought to demonstrate the presence of a carpogone and trichogyne, and to follow the development of a spore fruit, which results from the contact of spermatium and trichogyne. The germination of many spermatia points strongly to the conclusion that these are mere conidia and not male sexual cells. No fusion of sexual cells has yet been seen in lichens, and, until this is seen, it is impossible to settle the question of their sexual nature. The apothecium arises usually from certain more or less distinctly twisted hyphae lying between the medulla and the algal layer. Sometimes the point of origin is just beneath the cortex, especially near the margin, and in crustose forms it is in the hyphal layer just above the substratum. The development is essentially the same as in the other cup-fungi; the hyphal fundament increases in size, and becomes differentiated above into two sorts of threads. The first to grow up are the paraphyses, in the centre of which push up the club-shaped branches, which become the ascii. Spore formation in the ascus follows the method typical of all sac-fungi. The escape of the spores takes place through a terminal rift in the ascus or by the breaking up of the latter. The mature spores germinate readily under the proper conditions, usually sending out a single filament from each cell; large spores, however, such as those found in *Megalospora* and *Pertusaria*, produce many germinating filaments. The young mycelium is capable of slight development only, unless it comes in contact with the proper alga, when it grows at once into the thallus. The uncertainty that the spores will germinate in a place where the proper host occurs makes multiplication by spores much less sure than by soredia. In a few cases (*Endocarpon*, *Staurothele*, etc.), this disadvantage has been overcome by the development of algae in the thecium between the paraphyses and spore-sacs (hymenial gonidia).

These are ejected with the spores, and, clinging to the latter, furnish a certain substratum for the germination of the spores.

Origin and Classification.—Lichens are sac-fungi and rod-fungi which show more or less similarity in their vegetative body because of their parasitism upon certain algae. The clew to their origin and relationship is to be found in the inherited reproductive organ, the sporocarp, and not in the thallus. From this standpoint, the group is highly artificial, containing representatives of two distinct classes of fungi, the *Ascomycetes* and the *Basidiomycetes*. The absidiolichens are a small group, containing but a few genera: the ascolichens consist of the representatives of several unrelated families. It is evident that the lichens have not arisen from a single point, as members or offshoots of one line of development, but that they have originated at several widely separated points. They are of multiple origin; that is, they are polyphyletic. In ascolichens, the form of the sporocarp indicates the main places of origin; the *Verrucariaceæ*, with perithecia, are *Pyrenomycetales*; the *Graphidaceæ*, which show the hysterothecium, belong to the *Hysteriales*; the remaining families, *Caliciaceæ*, *Collemaceæ*, *Parmeliaceæ*, etc., belong to the *Pezizales*.

The following synopsis will indicate the relationship and limits of the various families of lichens:

Class Ascomyceteæ: fruit a sporocarp, spores borne in sacs (asci).

Order Pyrenomycetales: sporocarp a peritheciun.

Family Sphaeriaceæ: mycelium filamentous, saprophytic or parasitic on tissues.

Family Verrucariaceæ: mycelium thalloid, parasitic on yellow-green algae.

Order Hysteriales: sporocarp a hysterothecium.

Family Hysteriaceæ: mycelium filamentous, hysterothecium carbonaceous.

Family Hypodermataceæ: mycelium filamentous, hysterothecium membranaceous.

Family Graphidaceæ: mycelium thalloid, on algae, hysterothecium membranaceous or carbonaceous.

Order Pezizales: sporocarp an apothecium.

Apothecia and thallus leathery, waxy or carbonaceous, never gelatinous.

Family Patellariaceæ: mycelium filamentous, mostly saprophytic.

Family Lecidiaceæ: mycelium thalloid, apothecium sessile, exciple without algae (proper).

Family Cladoniaceæ: mycelium thalloid of two sorts, primary and secondary; apothecia borne on stalks (podetia), proper exciple.

Family Parmeliaceæ: mycelium thalloid, algae yellow-green, exciple with algae (thalline).

Family Pannariaceæ: mycelium thalloid, algae blue-green, proper exciple.

Apothecia and mycelium gelatinous.

Family Bulgariaceæ: mycelium filamentous.

Family Collemaceæ: mycelium thalloid, on blue-green algae.

Class Basidiomyceteæ: fruit a hymenophore, spores borne on stalks (basidia).

Order Hymenomycetales: hymenophore exposed on a pileus.

Family Thelephoraceæ: hymenophore smooth, mycelium filamentous or thalloid (in *Cora*, *Rhipidonema*, *Dictyonema* and *Laudatea*).

LICHFIELD — LICINIUS

Order Gasteromycetales: hymenophore enclosed in a peridium.

Family Sclerodermataceæ: peridium broad sub sessile, gleba excavate, mycelium filamentous, or thalloid in *Emericella*.

Distribution and Role.—Lichens are distributed over the entire earth: they are least numerous in the tropics and reach their maximum development in alpine and polar lands, where they often form the principal vegetation over immense stretches. Many species are widespread, especially in the northern hemisphere: some of these, such as *Cladonia rangiferina*, *Urzecularia scruposa*, *Usnea barbata*, etc., are truly cosmopolitan. In the tropical and temperate zones, the greatest wealth of lichens is found upon bark and wood. In alpine and polar regions, the stone and earth forms are predominant. In these places, lichens play their most important part in the economy of nature. They take the initiative in the disintegration of the hardest rock by virtue of the acids secreted by the thallus; they are likewise very effective in binding together the new soils which result in this way and in contributing organic material by their decay. In all rocky habitats they are the pioneers which prepare the way for the appearance of more highly organized plants, mosses, grasses, etc. In the case of tree-lichens, the tree is not affected by the lichen, except in so far as the bark may be ruptured by it mechanically. It is a question whether lichens exert any really injurious effect upon timber, though they probably hasten the decay of boards, posts, etc., by increasing the amount of moisture present.

A few lichens are of value as food. The most important among these is the so-called "reindeer" moss, *Cladonia rangiferina*, which covers vast stretches in the north and constitutes an invaluable supply of food for the reindeer and caribou. In Japan, *Gyrophora esculenta*, which is collected in abundance in the mountains, is of sufficient importance to be an article of export. The arid regions in northern Africa and western Asia produce large quantities of the manna-lichen, which is used to make bread, especially by the Tartars. This lichen is readily torn away from the substratum by the wind and is carried often to considerable distance before falling as "manna rain." This phenomenon has been observed repeatedly in modern times, and probably accounts for the manna of the Israelites. "Trip-de-roche" is an edible *Umbilicaria* of arctic America, but the presence of the bitter principle so common in lichens restricts its use as a food. Lichens owe their food value almost wholly to their high content of lichenin, or lichen-starch. Lichens, though once of extensive application in dyeing and in medicine, have fallen almost completely into disuse in both. The various kinds of orseille, which were made from *Roccella tinctoria* and held in high esteem for their brilliant purples, have been entirely replaced by the aniline dyes. Litmus, which is a similar dye made from a species of *Lecanora*, is still extensively used in chemistry because of its red coloration in the presence of an acid. "Iceland moss," *Cetraria islandica*, is still used officially: it contains cetrarin, a bitter principle which is tonic and astringent, and a large amount of lichenin.

Consult: Tuckerman, E., 'Synopsis of the North American Lichens' (1882); Schneider,

A., 'A Text-book of General Lichenology' (1897); Schneider, A., 'Guide to the Study of Lichens' (1898). FREDERIC E. CLEMENTS,
University of Nebraska.

Lichfield, lich'fēld, England, an episcopal city of Staffordshire, 17 miles southeast of Staffordshire. The principal edifice is the cathedral, a noble structure of early English and transitional architecture with a richly decorated west front, and three spires—two on the west, each 180, and one in the centre 280 feet high. The see of Lichfield was founded in 656. The city has interesting literary associations, Johnson, Addison, and Garrick, born in the town or neighborhood, having been educated at the old grammar school. Pop. (1901) 7,902.

Lichtenberg, Georg Christoph, gā-ōrg' kris'tōf lih'ten-bērg, German satirical writer and physicist: b. near Darmstadt 1 July 1742; d. Göttingen 24 Feb. 1799. He was educated at the University of Göttingen and became professor there in 1767. During frequent visits to England he collected material for his explanations of Hogarth whom he thus assisted to popularize in Germany. He gained great celebrity as a lecturer on physical science. His being a hunchback may very possibly have embittered a naturally satiric disposition. The best of his satires are those on the notorious literary pirate Tobias Göbhard; the essay on 'The German Novel'; 'Timorus,' ridiculing Lavater's zeal for proselytizing; and 'Pronunciation of the Wethers of Ancient Greece,' aimed at Voss's system of pronouncing Greek. His brilliant sayings have been collected and published in a separate volume, 'Lichtenberg's Thoughts and Maxims: Light Rays from his Works' (1871).

Lichtenberg, Leopold, American musician: b. San Francisco, Cal., 22 Nov. 1861. In early childhood he showed his fondness for the violin and received careful training. In his 12th year was asked by Henri Wieniawski, then on a visit to California, to become his pupil, and accordingly spent three years at Brussels Conservatory. Fresh from his European successes, he was engaged in Theodore Thomas' orchestra and then spent three years more abroad playing in the chief cities. On his return to America he became a member of the Boston Symphony Orchestra and later was appointed head of the violin classes at the National Conservatory of Music, New York.

Licinius, li-sin'i-üs, Caius, Roman tribune. He came of a plebeian family, but rose to the rank of tribune, receiving the surname of Stolo, or Useless Sprout, by reason of the law which he established forbidding any one to possess more than 500 acres of land. His reason for this was that when more land was cultivated by any one owner the latter could not pull up the useless shoots (*stolones*) which grew from the roots of trees. Another law of his enactment allowed the plebeians to share the consular dignity with the patricians; and he himself became one of the first plebeian consuls, 364 B.C.

Licinius, Caius Flavius, Roman emperor: b. Dacia about 270; d. 324. He was made Augustus by the emperor in 307, and became emperor of Rome after the death of Galerius about 312. He was defeated by his brother-in-law, Constantine, 323, and put to death the year following. His son, Flavius Valerius, de-

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clared Cæsar in 317, was slain at Constantinople in 326.

Lick, James, American philanthropist: b. Fredericksburg, Lebanon County, Pa., 25 Aug. 1796; d. San Francisco, Cal., 1 Oct. 1876. In 1821 he set up in the pianoforte business at New York, and later was a manufacturer of musical instruments at Buenos Ayres, Philadelphia, Valparaíso, and elsewhere. In 1847 he went to California, where he gained wealth through investments in real estate and various enterprises. In 1874 he placed \$3,000,000 at the disposal of seven trustees, by whom they were to be applied to specified uses. The principal divisions of the funds were: To the University of California, for the construction of an observatory and the placing therein of a telescope to be more powerful than any other in existence, \$700,000 (see LICK OBSERVATORY); for the building and maintenance of free public baths in San Francisco, \$150,000; to found and endow an institution of San Francisco to be known as the California School of Mechanic Arts, \$540,000; for the erection of three appropriate groups of bronze statuary to represent three periods in Californian history and to be placed before the city-hall of San Francisco, \$100,000; to erect in Golden Gate park, San Francisco, a memorial to F. S. Key, author of 'The Star-Spangled Banner', \$60,000.

Lick Observatory, astronomical department of the University of California. James Lick (q.v.), by deeds made in 1874 and 1875, charged a board of trustees to expend the sum of \$700,000 for the purpose of purchasing land and constructing "a telescope superior to and more powerful than any telescope yet made . . . and also a suitable observatory . . . to be made useful in promoting science." Under the provisions of this deed a site was selected in 1876 on the summit of Mount Hamilton about 26 miles, by road, from San José, Cal. The land (about 3,000 acres) was granted at various times by the United States and by the State of California.

Astronomical observations of precision and delicacy require a steady atmosphere as well as a very transparent one, and the site chosen is favorable in both respects. This was thoroughly tested in 1879 by Prof. S. W. Burnham before any buildings were erected. The first board of trustees (D. O. Mills, president) chose as chief advisers Profs. Simon Newcomb and Edward S. Holden, and appointed Prof. Holden as director. In October 1874 the latter submitted a plan for the building of the observatory and a programme of work, which were accepted by the trustees, according to which the buildings were constructed and the work carried on from 1874 to 1897. The County of Santa Clara built a fine mountain road to the summit, in 1876, at a cost of \$78,000. The work of construction was begun in 1880 by the third board of trustees (Capt. R. S. Floyd, president) with Thomas Fraser as superintendent. To obtain a level platform for the observatory 70,000 tons of rock were blasted from the summit. The instruments were ordered from specifications by Dr. Holden, except the object-glass of the great telescope. After a series of experiments Prof. Newcomb advised the construction of a refracting telescope for the main instrument of the observatory. The

glass disks were founded by Feil & Mantois of Paris and figured by Alvan G. Clark. The finished objective is 36 inches in diameter, and has a focal length of 56 feet 2 inches. Besides the visual objective, there is a third lens of 33 inches aperture. When this is placed in front of the visual objective the combination becomes a photographic object-glass of 570 inches focal length (the diameter of the photographic image of the moon is about 5.2 inches). The cost of the visual objective was \$50,000, of the photographic corrector about \$13,000, and of the mounting of the telescope about \$45,000. The cost of the dome complete was about \$85,000; of the whole observatory about \$610,000. The mounting of the great telescope was made by Warner & Swasey, of Cleveland. The whole weight of iron pier and mounting is about 37 tons. The moving parts of the latter weigh about 7 tons; the tube weighs nearly three tons. The telescope is used for visual purposes, and micrometer measurements; it is also used for photographic and for spectroscopic observations. Its steel dome is 75 feet in diameter, and weighs 100 tons. It was built by the Union Iron Works of San Francisco. The floor of the dome is movable vertically (about 16½ feet), according to a plan by Sir Howard Grubb, which ensures a convenient position for the observer, no matter whether the telescope is pointing horizontally or vertically. Other instruments are a 12-inch and a 6-inch refractor, a 4-inch comet-seeker, a 6-inch meridian-circle, a 5-inch photographic telescope, a 4-inch transit, a 5-inch photoheliograph, etc.

The great telescope has been in constant use since its erection, and its optical quality has been proved to be excellent. The admirable design and construction of its mounting and dome have much facilitated its work. In 1895 Edward Crossley, M. P., of Halifax, England, presented to the observatory his 3-foot reflector, which has been a powerful auxiliary to the great refractor. The observatory constitutes the Lick Astronomical Department of the University of California. The directors of the observatory have been: Edward S. Holden (1874 and 1885-97); James E. Keeler (1898-1900); W. W. Campbell (1900—). Its staff has comprised many noted observers: Messrs. Burnham, Barnard, Schaeberle, Tucker, Perrine, Hussey, Aitken, Wright and others. In 1888 the staff was composed of the director, four astronomers, and one assistant. The staff of the observatory in 1903 consists of the director, 3 astronomers, 2 assistant astronomers, 4 assistants, 3 fellows, 1 secretary.

The observatory was one of the very first to be located on a site specially chosen for its adaptation to astronomical work, and its success has had an important effect upon the science of practical astronomy. No one would now think of locating a great observatory without careful consideration of the site to be occupied. The mountain observatories of the world owe much to the experiments made at Mount Hamilton.

The principal objects of research have been: The visual and photographic observation of planets and satellites; the fifth satellite of Jupiter was discovered here by Barnard in 1892. A systematic search for comets has been kept up and 14 unexpected comets have been discovered—Barnard (3), Perrine (9), Coddington

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(1), besides a comet discovered by Schaeberle during his observations of the solar eclipse in Chile. Many periodic comets have also been detected and observed. The orbits of new comets have always been promptly computed at the observatory and ephemerides sent out to other stations. Four asteroids were discovered by Coddington in 1898-9. Meteors have been observed and photographed, and their orbits calculated. Double stars have been assiduously observed and many new discoveries made by Burnham, Hussey and Aitken; the orbits of a considerable number of binaries have been calculated. Observations of the zodiacal light and of the aurora have been made by Barnard and others. Successful expeditions have been sent to observe all total solar eclipses since 1888, and very much has been added to our knowledge of solar physics in this way. The transit of Venus of 1882 and three transits of Mercury have been observed and photographed here. The positions of a large number of fixed stars have been determined with great precision by Tucker. Many photographs of the sun and moon have been made. The negatives of the moon have been utilized in the preparation of an atlas of the moon (scale 10 feet to the moon's diameter) by Prof. Weinek, and on a scale of three feet by Messrs. Holden and Colton. A great number of important photographs of the milky way were made here by Professor Barnard and others, and of comets and nebulae by Keeler, Hussey, Perrine and others. A complete outfit of seismometers, for recording the intensity of earthquake shocks was installed at the observatory in 1888, and it was supplemented by similar instruments at Berkeley and at other points in California and Nevada, which regularly report to Mount Hamilton. In this way the elements for a seismometric record for the State were collected and regularly published. At the same time a list of all recorded shocks on the Pacific coast since 1769 was compiled and discussed by Dr. Holden. Spectroscopic observations of nebulae, new stars, comets, stars and planets have been made in great number and with previously unattained precision by Messrs. Keeler, Campbell, Wright, Perrine and others.

The chief problem of the great telescope is to determine the motion of the solar system by spectroscopic observations. The photography of stellar spectra was proposed in the plan of 1874 and attacked in 1888, and it has been followed with marked success, especially in the hands of Prof. Campbell. Since 1896 more than 2,000 negatives of stellar spectra have been secured. A preliminary discussion by Campbell leads to the result that the solar system is moving toward a point in 277° R. A. and 20° N. D., at a speed of 19.89 kilometers (12.35 miles) per second. An expedition was sent (at the cost of D. O. Mills) to the Southern hemisphere in 1903 to extend this research to Southern stars.

The observatory publishes a series of octavo 'Contributions' (No. 1 in 1889, No. 5 in 1895), of quarto 'Publications' (Vol. I. in 1887, VI. in 1903) and a quarto 'Bulletin' since 1901—a journal. The Astronomical Society of the Pacific founded by Prof. Holden in 1889, has close relations with the observatory, and has printed 15 octavo volumes. Visitors are freely admitted to the observatory in the day time to the number of 5,000 or more annually. On Saturday evenings visitors are admitted to look through

the telescopes, and as many as 150 to 200 are frequently registered. In this way the observatory has rendered important services to popular education. EDWARD S. HOLDEN, Librarian U. S. Military Academy, West Point.

Lick'ing, (1) a river of Kentucky, rising in Floyd County, among the Cumberland Mountains, and, after a course of about 200 miles, falling into the Ohio at Newport, opposite Cincinnati. (2) A river of Ohio, the former Indian Pataskala, rising near the centre of the State, and, after a course of 80 miles, flowing into the Muskingum near Zanesville. It furnishes valuable water power.

Lic'orice, or Liquorice, a genus of perennial plants (*Glycyrrhiza*) of the order *Leguminosæ*. About a dozen widely dispersed species are recognized, of which *G. glabra* is the most important, since it furnishes the licorice of commerce. It is characterized by long rootstocks, odd-pinnate leaves, and racemes of separated flowers of various colors, usually pale violet. The plant is a native of southern Europe and western Asia, and is cultivated in Spain, Italy, Russia, and some other countries of the old world, the best grades coming from the first two countries mentioned. The roots and the extracted sweetish principle, of which about \$500,000 worth are imported into the United States annually, are used in making plug tobacco and porter, to flavor cooling drinks, and by druggists to disguise the unpleasant taste of some drugs. Attempts to cultivate the plant in Louisiana and California has proved partially successful, but the crop is not profitable, since three to four years must elapse before it can be dug, and the selling price is small. Cuttings of the rootstock are planted about three feet apart, and when established the plants are allowed to shift for themselves until harvest, when the land is plowed and the rootstocks pulled by hand. No further planting is necessary, since the bits of root left will restock the land.

Lic'tors, in ancient Rome, a name given to those public servants who attended upon the chief magistrates to fulfil their commands, bearing axes tied up in bundles of rods, which were called *fascæ*. When a magistrate of high rank appeared in public the lictors preceded him in a file, following each other. It was their duty to clear the road of the populace. The dictators were preceded by 24 lictors; the consuls, decemvirs, and military tribunes, by 12; the provincial *prætors*, master of the horse, and *proprætors*, by six; and the *quæstors* by five.

Liddell, lid'el, Henry George, English Greek scholar and Anglican clergyman: b. 6 Feb. 1811; d. Ascot, Berkshire, 18 Jan. 1898. He was educated at the Charterhouse and Christ Church, Oxford; took priest's orders in 1838; and for some years lived in Oxford as a tutor of Christ Church. He took no part in the theological controversies which stirred the Oxford of his time, but worked steadily with R. A. Scott of Balliol, afterward Dean of Rochester, at the 'Greek Lexicon' — the well-known 'Liddell and Scott' of successive generations of students — which forms his chief title to remembrance. It first appeared in 1843, but has undergone extensive revision and enlargement in subsequent editions, of which the 8th appeared in 1897. In 1846 Liddell was appointed the head-master of Westminster School,

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and in 1855 became dean of Christ Church. He held the deanery till his retirement to Ascot in 1891, and during his rule many salutary changes were introduced. Besides the 'Lexicon,' founded on the Greek-German lexicon of Passow, he wrote a 'History of Rome' (1855), afterward abridged as 'The Student's Rome.' Consult Thompson, 'A Memoir of H. G. Liddell' (1899).

Liddon, lid'ón, Henry Parry, English clergyman: b. North Stoneham, Hampshire, 20 Aug. 1829; d. Weston-super-Mare 9 Sept. 1890. He was educated at Christ Church, Oxford, where he was graduated in 1850. The year after his ordination to the priesthood he was appointed vice-principal of Cuddesdon College, which bishop Wilberforce of Oxford had recently founded, but resigned in 1859 and became vice-principal of St. Edmunds Hall, Oxford. In 1870 he was chosen as Ireland professor of exegesis, but after the Universities Commission had completed their work, which he looked upon as desecrating, he resigned (1882). From 1870 till his death he was canon of St. Paul's and his sermons under the dome attracted crowds of breathless hearers. He was in fact the last prominent survivor of the theological school represented by Pusey and Keble, and carried its tradition even into the period of the new Oxford movement represented by 'Lux Mundi,' a work which he ardently controvorted. He also was prominent in the controversies concerning the Public Worship Regulation Act, which he opposed, and the Athanasian Creed, which he defended. An inflexible High Churchman, an uncompromising theologian of the Nicene school, he had much influence even where his rigid dogmatism carried no conviction, through the loftiness of his personal character, his transparent sincerity and a noble eloquence, whose power and sweetness recalled the best utterances of Bossuet and Massillon, preachers on whom he palpably bestowed much earnest study. During the last years of his life he was engaged in writing Pusey's life on a voluminous scale, but had completed but three volumes when he died. He was elected bishop of Edinburgh, in 1886, while traveling in the East for his health, but his decline prevented him from accepting. He published many sermons, but the only series likely to prove of permanent importance is his 'Bampton Lectures' 'On the Divinity of Our Lord and Savior Jesus Christ' (1866).

Lie, lē, Jonas Lauritz Edemil, Norwegian novelist: b. Eker, Norway, 6 Nov. 1833. He was educated at the University of Christiania and in 1859 settled as a lawyer at Kongsvinger, to the northeast of Christiania. He went to Christiania in 1868 to support himself by journalism and literary work, and in 1870 became famous with his novel 'The Visionary.' The profits from its publication enabled him to spend some time in northern Norway, and to visit Holland, Belgium, France, and Italy. Returning in 1874, he received the poet's pension from the Storting, resided in Dresden 1877-81 and from 1882 till 1891 lived in Paris in comparative retirement writing his most notable works, and in the latter year he went to Rome, from which he returned in 1892 to Norway. The following are his chief novels and stories: 'The Visionary' (1870); 'Stories and Sketches of Norway' (1872), containing the story entitled 'The Horse

of Nordfjord'; 'The Three-Master Future, or Life in the North' (1873), a series of loosely connected stories or sketches dealing with the life of Norwegian seamen; 'The Pilot and his Wife' (1874), showing a considerable advance on his earlier works; 'Thomas Ross' (1878); 'Adam Schrader' (1879); 'Rutland' (1880); 'Forward! Scenes of the Sea' (1882); 'Life's Slaves' (1883), a powerfully realistic study of a soul involved in the net of circumstance; 'The Family of Gilje' (1884), a lighter story of Norwegian life; 'The Gulf' (1885), treating of the gradual decline of an old Norwegian family; 'Eight Stories' (1885); 'The Commandant's Daughters' (1886), by many regarded as his masterpiece; 'Two Lives' (1887), a penetrating study in the psychology of marriage; 'Maisa Jons' (1888); 'Mischievous Powers' (1889); 'Trold' (1891-2); 'Niobe' (1893), in which his subject is family troubles arising out of differing social, political, or religious views held by parents and children; and 'Grandfather' (1895). He published a volume of poems in 1867, and he has written several dramas, 'Faustina Strozzi' (1875), 'Grabow's Cat' (1880), and 'Merry Wives' (1894). In 1894 he published an important critical work, 'Honoré de Balzac, The Man and the Artist.' Lie's chief works have been translated into German, English, and other languages. He is a realist with a fine sense of humor and profound sympathy with the humble and the unfortunate, and is a master in psychological analysis.

Lieber, lē'bér, Franz, American publicist: b. Berlin, Germany, 18 March 1800; d. New York 2 Oct. 1872. He volunteered as a soldier at 15, and was in the battles of Ligny, Waterloo, and Namur. He served also in the Greek war of independence, recording his experiences in 'Journal in Grecce' (1823). He settled in the United States in 1827, and during the next five years was occupied with the compilation of an 'Encyclopædia Americana' (13 vols.). While professor of history and political economy in South Carolina College (1835-56), he wrote the three great works by which he is best known, 'Manual of Political Ethics' (1838); 'Legal and Political Hermeneutics or the Principles of Interpretation and Construction in Law and Politics' (1839); 'Civil Liberty and Self Government' (1853). In 1857 he became professor of history in Columbia and later of political science in the Columbia Law School. During the Civil War period he was a firm supporter of the Federal government and was frequently consulted by the secretary of war. His war code, officially designated as 'Instructions for the Government of the Armies of the United States in the Field' (1863), made him still more widely known. He was a member of the French Institute and of many learned societies at home and abroad. Consult 'Lives' by Perry (1882); Harley (1899).

Lieber, Oscar Montgomery, American mineralogist and chemist: b. Boston, Mass., 8 Sept. 1830; d. Richmond, Va., 27 June 1862. He was a son of Franz Lieber (q.v.) and was educated at the Universities of Berlin and Göttingen and the School of Mines at Freiberg, Saxony. In 1850 he became State geologist of Mississippi and afterward engaged in the survey of Alabama and South Carolina. In 1860 he went to Labrador as geologist of the Ameri-

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can astronomical expedition. During the early part of the Civil War he served in the Confederate army and was fatally wounded at the battle of Williamsburg. He published 'The Assayer's Guide' (1852); 'The Analytical Chemist's Assistant' (1852); 'Geology of Mississippi' (1854).

Liebig, Justus, yoos'toos lē'bīg, BARON von, German chemist: b. Darmstadt 12 May 1803; d. Munich 18 April 1873. He studied in Bonn and Erlangen, was graduated in 1822, and the same year went to Paris, where he gained the favor of Humboldt by his paper on fulminic acid and the fulminates, read before the French Academy (1824). He thus obtained access to the private laboratory of Gay-Lussac. In 1824 he was appointed extraordinary professor and in 1826 ordinary professor of chemistry at Giessen. Here he opened the first experimental laboratory for college students, and the university soon became the European centre of chemical studies. He had remarkable success as a teacher, and pupils streamed into his class room from every country. The most illustrious chemists of the last century acknowledge their obligations to him as their master. He gave chemistry a settled position in Germany, and turned it into a real science to be taught and learnt by means of experiment. As an original investigator in the domain of chemistry he has shown himself a reformer of the sciences of physiology and agriculture. He may be said to be the founder of modern organic chemistry, and its necessary method of analysis. He analyzed many organic acids; discovered chloroform and chloral; he made the theory of the composition of ether, and the oxidization of alcohol subjects of new experiments, in the course of which he discovered aldehyde. He determined the basicity of many acids; analyzed the chemical composition of urine and the products of uric acid, and made profound inquiries into the juice of flesh, and its component substances. He raised chemistry from a position of obscurity and unprofitable hypothesis into its present all dominating position by his theory of the constitution of alcohol, ether, etc., and his work on the benzoyl compounds is especially remarkable in this connection. The industrial importance of his discoveries is great. Cyanide of potassium is largely employed in electro-plating and in the manufacture of ferrocyanides. His improved method of producing this cyanide has cheapened manufacture, just as his discovery of aldehyde has led to improved methods in the making of vinegar and looking-glasses. The result of his vast discoveries has been especially felt in the domains of medicine, agriculture, and food-hygiene. His great generalization that the mineral and organic world were composed of the same chemical elements, and were subject to the same chemical mutations, revolutionized science. He traced for the first time the transformation of inorganic into organic substances in plants, from which they were transferred to the organisms of animals. His exact statement of the elements received by plants from the soil and air enabled him to prescribe the composition of efficient fertilizers and thus, in the treatment and analysis of soils, to raise the fundamental operations of agriculture to the level of exact science. See CHEMISTRY; AGRICULTURE.

Consult: Liebig, 'The Natural Law of Husbandry' (1863); 'Animal Chemistry in its Application to Physiology and Pathology' (1846); 'Handbook of Organic Analysis' (1853); Hoffmann, 'The Life-Work of Liebig in Experimental and Philosophical Chemistry' (1876).

Liebknecht, Wilhelm, vil'hēlm lēp'knēht, German Socialist: b. Giessen 29 March 1826; d. Berlin 6 Aug. 1890. He studied at the University of Giessen and later at Marburg and Berlin. He was early interested in the writings of St. Simon, and in 1848 went to Paris to take part in the revolution there; then joined in the unsuccessful attempt to make Germany a republic, and was imprisoned nine months without trial. When released he went to Switzerland, where he tried to unite the trade unions on a socialistic basis, was again arrested, handed over to the French authorities, and banished to England. While there he became an intimate friend of Marx and Engels (qq.v.) and was a member of the Communist League. In 1862 he returned to Germany, continued his socialistic agitation, and in 1865 was banished from Prussia. He went to Leipsic, where he met Bebel (q.v.), was active in trade union organization, and was one of the founders of the Saxony Volkspartei soon absorbed by the German Social Democratic party (1868), of which he was from the first a leading member. In 1867 he was candidate for the North German Parliament, but was under arrest and lost the election; he was later elected. In 1868 he was made editor of the 'Demokratisches Wochenblatt,' the next year enlarged and published under the name of 'Volkstatt.' In 1870 he denounced the Franco-Prussian war, for which he was imprisoned three months, and later so bitterly attacked Bismarck that he was again imprisoned. In 1874 he was elected to the Reichstag of which he was a member almost constantly till his death. He was one of the strongest leaders of his party in that body, and very popular and highly respected among German working-men. In 1890 the name of the 'Volkstatt' was changed to 'Vorwärts,' and Liebknecht was retained as editor. He has written 'Die Grund- und Bodenfrage' (1874), a discussion of the land question from the Socialist standpoint; 'Ein Blick in die Neue Welt' (1887), an account of his visit to the United States; 'Robert Blum und seine Zeit' (1890); 'Robert Owen' (1892); and 'Socialism, what it is and what it seeks to accomplish' (translated and published in the United States). Consult: Aveling, 'Wilhelm Liebknecht and the Social Democratic Movement' (1896).

Liechtenstein, lēh'tēn-stin, a small independent principality, practically a portion of the Austro-Hungarian monarchy and united with the Austrian Customs-Union since 1866, between Vorarlberg, Tyrol, and Switzerland; area, 65 square miles, pop. (1901) 9,477. The surface has a fertile soil, yielding abundance of pasture, corn, wine, fruit, and flax. The capital, Vaduz, has about 1,000 inhabitants. The reigning family date from the 12th century, and are descendants of free barons who became princes of Liechtenstein in 1608.

Liège, lē-āzh, Belgium, (1) the easternmost province bordering on Rhenish Prussia and the Netherlands. Area 1,117 miles. The surface

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is diversified with heights varying from 300 to 2,000 feet, and well wooded. It contains rich coal and iron mines. The northern part called Herveland is exceedingly fertile and highly cultivated, affording pasturage for cattle and producing large quantities of butter and Limburg cheese. Pop. (1900) 826,175. (2) An episcopal city and the capital of the province at the confluence of the Ourthe and Meuse, 54 miles southeast of Brussels. The city has been considerably modernized since 1860 by the construction of fine quays and bridges along the course of the Meuse throughout the city. It has numerous striking public buildings including the Gothic cathedral of St. Paul, the Palais de Justice and the celebrated university, occupying extensive grounds, with special institutes for various sciences, a school of mines, a school of arts and manufactures, and an important library. Liège is one of the largest manufacturing towns of Europe, owing principally to its situation in a district abounding with coal, iron, lead, copper, and marble. Cannons and firearms of every description, steam engines, and machinery, hardware of every kind, watches, jewelry, bronze and other ornaments, woolens, cottons, etc., are made. Liège dates from the 6th century. Pop. (1900) 173,706.

Lien, lē'ēn or lēn, a legal claim on or upon property; a legal right in one person to detain the goods of another until some claim of the former against the latter has been satisfied. Blackstone says a lien may be either particular or general; the former is where the claim of retainer is made upon the goods themselves, in respect of which the debt arises, a claim which the law favors. The other, or general lien, is where goods are retained in respect of a general balance of account, which is less favored. Though general liens are not favored by law, yet in some cases they have become allowed and established by usage, as in the case of attorneys upon the title-deeds and documents of their clients; and factors, warehousemen, and others, upon goods confided to them in the ordinary course of business.

Lieuely, Greenland. See GODHAVEN.

Lieutenant, lū- or lēf'tēn'ant, a military term, which, like captain, and many others, has received gradually a much narrower meaning than it had originally. Its true meaning is a deputy, a substitute, from the French *lieu* (place, post) and *tenant* (holding). A *lieutenant-général du royaume* was a person invested with almost all the powers of the sovereign. Lieutenant-general is the title of the commanding general of each division of an army, personating the general-in-chief. Lieutenant-colonel is the officer between the colonel and major. The term lieutenant by itself, in military language, signifies the officer next below a captain, whether in the cavalry or infantry. There are also second lieutenants ranking below lieutenants. A lieutenant in the navy is the officer next in command to the captain of a ship. He takes rank both in the British and United States services with a captain in the army, and after eight years' service he ranks in Britain with a major. In the United States a lieutenant ranking with a major is called lieutenant commander.

Lieutenant-colonel, a military title, the officer next in rank to a colonel, and the senior of a major. He has actual command of a regiment, and is responsible for the discipline and comfort of the troops under his command.

Lieutenant-general, formerly general officer in the United States army, ranking above a major-general and below a general. The office of lieutenant-general was first created by Congress for George Washington in 1798, during the troubles between the United States and France. It then lapsed till renewed by Congress for Gen. Winfield Scott, who was made lieutenant-general by brevet. In 1864 it was again revived for Gen. U. S. Grant, and continued for Generals Sherman and Sheridan. The grade was also conferred on Gen. John M. Schofield, 5 Feb. 1865, who held it till his retirement, 29 Sept. following. An act of Congress of 6 June 1900 provided that "the senior major-general of the line commanding the army shall have the rank, pay and allowances of a lieutenant-general"; and on the reorganization of the army in February 1901 the grade was revived and President McKinley appointed Maj.-Gen. Nelson A. Miles its incumbent. In 1903 the rank was again abolished, an act of Congress providing for a General Staff, the chief of staff to take the place of the lieutenant-general.

Lieutenant-governor, an executive office of several of the States, ranking next to the governor. He performs the duties of a governor in case of the latter's death, absence from the State, or inability to act, and is presiding officer of the State senate.

Liezen-Mayer, lētsēn-mī'ér, Alexander, Hungarian painter: b. Raab, Hungary, 24 Jan. 1839; d. 1898. He studied at Vienna and Munich, attending the art academies in those places, and afterward entered the studio of Piloty (1862) in the latter city. Under this master he painted his 'Queen Maria and Elizabeth of Hungary at the Grave of Louis le Grand' and 'The Coronation of Charles of Durazzo in the cathedral of Stuhlweissenburg.' Three years later he carried off the first prize at the Munich Academy exhibition. In 1867 he painted 'Maria Theresa'; 'The Child of a Poor and Sickly Mother'; and as drop-scene for the Munich theatre, 'Poesy Surrounded by the Muses.' In 1867 he began to paint portraits, and also furnished illustrations for the works of Goethe and Schiller. During a residence in Vienna (1870-2) he executed portraits of the emperor and many of the nobility. On his return to Munich he painted some ideal figures from Shakespeare's 'Cymbeline,' and some scenes from Goethe's 'Faust'; and in 1873 'Elizabeth Signing the Death Warrant of Mary Stuart' (in the Museum at Cologne), and one of his masterpieces, although its principal merit lies in the perfection of the technique. He produced also many cartoons for woodcut reproduction as illustrations of the poets. For three years he was director of the Art School at Stuttgart (1880-3), when he was appointed professor of historical painting in the Munich Academy.

Life. No definition of life has ever proved quite satisfactory. Some include too much, others omit certain phenomena, a third class assume conditions purely hypothetical, while many are unintelligible. Bichat says that life is "the sum total of the forces that resist

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death"; Treviranus, that it is "the constant uniformity of phenomena with diversity of external influences"; Duges, that it is "the special activity of organized bodies"; and Beclard, that it is "organization in action." De Blainville's definition is: "Life is the twofold internal movement of composition and decomposition, at once general and continuous." But according to Herbert Spencer this conception is in some respects too narrow and in others too wide. Of his own definition, that it is "the co-ordination of actions," he says—"like the others this definition includes too much, for it may be said of the solar system with its regularly recurring movements and its self-balancing perturbations, that it also exhibits co-ordination of actions." His amended conception of life is: "The definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external co-existences and sequences." G. H. Lewes suggests the definition: "Life is a series of definite and successive changes, both of structure and composition, which take place within an individual without destroying its identity." This is one of the most satisfactory definitions that has as yet been given. The most recent attempts have been in the direction of proving that life is merely a form of energy or motion, and show the influence which the physical sciences have had in recent years over knowledge and speculation, which formerly were mainly based on biology and theology. The simplest answer to the question probably is: Life is metabolism.

Leaving the subject of attempted definition, it will be profitable to observe some of the characteristics of life as compared with its absence; that is, substantially, a comparison of the organic with the inorganic part of the universe. The boundary between living and not-living matter is much less distinct than rough inspection suggests, but some of the most striking characteristics which distinguish living organisms from other objects of our experience which are not-living may be pointed out. The distinctive properties of living matter are, first, the fact that it is organized; second, that it has the power of perpetuating itself within definite limits by chemically taking and adapting (assimilating) suitable material from the surrounding media, and in the process generating heat (energy) in the absence of which it disappears; and, third, that it has the power of self-reproduction. Life cannot exist without that chemical interchange between the organism and its inorganic environment, and between the constituent parts of the organism which is summed up in the word metabolism (q.v.). Objections have been made to some of the definitions quoted above, and to others, that they assumed the existence of organization. But so far no evidence is present of any living thing without organization. The simplest one-celled animals and plants (see AMEBA; PROTISTA) consist of organized protoplasm. This fundamental living substance, called protoplasm (q.v.), is of complicated structure and chemical composition. Its structure differs in different organisms; but it everywhere consists of a combination of viscous "plasma" and water. The plasma contains the chemical substances upon whose changes life depends. Protoplasm is, however, not homogeneous. At least two kinds are found in every mass, the cytoplasm constituting the major part of the

whole; and the nucleus, the nutritive and reproductive centre. The combination of cytoplasm and nucleus forms a cell. Combinations of cells constitute the bodies of all organisms, large or small, past or present. These combinations are accumulations resulting from the property, characteristic, regularly and fundamentally, only of living organisms, of the doubling of molecules, by which growth is effected.

The fundamental vital phenomena may be regarded as (1) nutrition and (2) reproduction. The conditions under which these activities may be manifested are narrow in general, and the more closely limited in respect to a particular organism in proportion as its organization is more or less complicated. These conditions belong to the environment, from which the organism must take the elements necessary to its continued repair of loss—in other words, get food. Essential elements are oxygen, water, and certain salts; in a word, all the constituent elements of protoplasm, at the least, must be obtainable from the air or water, in order that vitality may persist. It is needful, however, that certain harmful things (poisons) should be absent, or the organism will be killed. Death will also follow excess or deprivation of the proper proportions of the food elements; too much or too little water; a raising or lowering of the temperature above certain points; the presence of light, proper electrical conditions, etc. The simplest animals and plants, consisting of little except protoplasm and water, have great power of resistance to untoward conditions, and the range of diversity in circumstances in which they are able to survive is very wide. Protozoans, eggs of lowly animals, spores of fungi, and the like, slowly dried show the possibility of persistence for prolonged periods without water. Small nematode worms are said to have survived desiccation for 14 years; and certain starchy seeds, kept thoroughly dry, may germinate after 10 or 20 years. As to temperature, dry yeast will live after exposure to 70° C., and a portion survives even at 100° C.; Pasteur heated dry fungoid spores without fatal results to 120° C., but the same when moist were killed at the boiling-point. Some bacteria are said to resist boiling, but the reverse is usually true. Kühne killed marine amoeba at 35° C., while fresh-water forms stood 10° more. Even seeds have been known to withstand 100° C., but it is familiar that a longer exposure to much lower temperature is usually fatal. Higher plants have been known to survive burial under a glacier for four years; and fishes, frogs, etc., have often revived after being frozen hard in ice. Dry yeast, according to Cagniard de la Tour (quoted by Huxley), survived -60° C., but when moist was killed at -5° C.; yet Cohn cooled bacteria to -18° C. without death, and seeds have survived such an extreme as -120° C. To illustrate the diverse sensitiveness of animals, Semper notes that a temperature about the freezing-point of fresh water kills Infusoria but not pond-snails, that the minimum of vital activity in the former was seen at 4° C., in the latter at 12° C., yet the optimum for both is the same, namely, about 25° C. These facts illustrate how wide are the conditions to which some organisms have been able to adapt themselves; but they show that limits exist; and only emphasize the fact of common knowledge that life in its higher manifestations is dependent upon

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the maintenance of a few well-defined conditions, and that innumerable accidents may bring it to a permanent end (see DEATH), whereupon the material which it animated instantly becomes inert matter subject only to the laws that govern the inorganic world.

Reproduction is the means of securing that continuity of life which is one of its primal characteristics, and consists in the separation from the original organism of a part, relatively greater or less in proportion as the organization so divided is simple or complicated, which part is equally endowed with the potentialities of living and reproduction, and normally will reproduce its kind in turn.

For an account of the speculations and reasoning as to the origin of life on the earth, see ORIGIN OF LIFE; PROTISTA.

Life and Advent Union. See ADVENTISTS.

Life-boat, a boat for saving persons from shipwreck, and so built that it can live in a stormy sea. It must be constructed with strength sufficient to resist violent shocks from the waves, the rocky beach, or collision with the wreck; be buoyant enough to avoid foundering, and to float though loaded with men and filled with water; have facility in turning; and when capsized be able to right itself. Such boats are now maintained at most of the life-saving stations in America and Europe, ready to put to sea at once if their services are required, and provided with the means of being conveyed to the beach and launched with all possible rapidity. The first patent taken for a life-boat was as early as 1785. In 1789 Henry Greathead of England patented the best form of life-boat, and by the year 1804 his boat had saved nearly 300 lives. Till 1851 Greathead's invention was almost the sole one in use, though numerous others had been either introduced or proposed; but in that year no fewer than 50 models of improved life-boats were sent to the London Exhibition in competition for a prize offered by the Duke of Northumberland for improved construction. James Peake of Woolwich Dock-yard, by combining the excellencies of the competitive boats, and adding others suggested by his own experience, designed a boat which, gradually improved from time to time, became the recognized model, and has been adopted as the standard for boats in all countries. This life-boat possesses in the highest degree all the qualities which it is desirable that a life-boat should possess:—1. Great lateral stability, or resistance to upsetting. 2. Speed against a heavy sea. 3. Facility for launching and taking the shore. 4. Immediate self-discharge of any water breaking into her. 5. The important advantage of self-righting if upset. 6. Strength. 7. Stowage-room for a large number of passengers. The great breadth of beam (8 feet) in proportion to her length (33 feet) is to diminish the liability to capsize in a heavy sea. The relieving-tubes, by which any water that breaks into the boat is immediately self-discharged, are a most beautiful contrivance. Such are the precautions for the safety of the crew that loss of life in the conduct of the boat is of rare occurrence. The life-boat transporting carriage is an important auxiliary to the boat. The life-boat is kept on this carriage in the boat-house ready for immediate transportation to the spot most favorable for launching to the wreck. In this

way a greater extent of coast can secure the benefits of the life-boat than could otherwise be the case. Even when the launch is from the immediate vicinity of the boat-house the use of the carriage saves much time, which in a case of shipwreck may prove of the last importance. Besides, a boat can be readily launched from a carriage through a high surf, when without a carriage she could not be got off the beach. The machine is admirably contrived, and the boat may be launched from it in an upright position with her crew on board. To render it more manageable and of the greatest possible utility, the fore and main bodies can be detached from each other by the withdrawal of a forelock pin.

Life-buoys. See LIFE-PRESERVERS.

Life-estate, in the common law, as applied in England and the United States, a freehold not of inheritance; an estate or interest in real property for a life, and which is either conventional or legal. A conventional life-estate is expressly created by the act of the parties, and is for the life of the owner, or for the life of another, in which case it is called an estate *pour autre vie*. A legal life-estate is either tenancy-in-tail after possibility of issue extinct; or what in the older country is technically designated courtesy of England, that is, the life-interest held by a husband in his wife's fee-simple or fee-tail estates, general or special, after her death; or dower, that is, the right which a wife has for her life in the third part of the lands and tenements held in fee-simple, fee-tail-general, or as heir in special tail by her husband at the time of his decease. The tenant for life may cut wood to repair fences and for household fuel. If there is an open mine on the estate he may work it for his own profit, but he cannot open one. See ESTATE; FEE; FEE SIMPLE; ENFEOFFMENT; FORFEITURE.

Life-everlasting, one of the everlastings (*Anaphalis margaritacea*), called the pearly or large flowered; also silver-leaf, cotton-weed, none-so-pretty, etc. See EVERLASTING.

Life-insurance. See INSURANCE, LIFE.

Life-mortars. See LIFE-ROCKETS.

Life-preservers are inventions for the preservation of life in cases of shipwreck. In the mercantile marine and passenger ships there are now life-belts for every passenger and every member of the crew. Buoys are carried on the bridge and at the stern of most ships in the mercantile marine. The danger to ships' ordinary life-boats is that, from being so long out of the water, unless attended to they get so dry that when floated they fill. Although against regulations, these boats have been known to be filled with cargo. Sometimes the handiest life-buoy is an empty water-cask, well bunged up, and with ropes around it to hold on by. There are various kinds of buoyant pillows, life-jackets of india-rubber cloth, and mattresses. The cork-mattress can float three men in an upright position.

The life-belt commonly used was designed by Admiral Ward of England. It is made of cork covered with canvas, and is both strong and buoyant. It has four separate compartments, so that if one should be punctured and burst, the belt's buoyant power is not entirely destroyed. Each life-belt must have sufficient extra buoyancy to support a man heavily

LIFE-RAFTS — LIVE-SAVING SERVICE

clothed, with his head and shoulders above the water, and to enable him to support another person besides himself. It must be flexible in order to fit tightly into the shape of the wearer. There is a division between the upper and lower parts so that it can be securely fastened round the waist, and not impede breathing or the muscular action of the chest or arms. See LIFE-BOAT; LIFE-RAFTS.

Life-rafts are various floating apparatus for saving life in case of shipwreck. A life-raft invented in England in 1870 is triangular in shape, and constructed of wood, cork, and rope-netting. It has the advantage of being handy and could be easily hauled to and fro between a ship in danger and the shore. Other patent life-rafts are merely square frames buoyed up by a cask at each corner. Empty water-casks well bunged up are very ready and effective instruments of safety in shipwreck, and should have ropes attached to them to hold on by. Frames of bamboo and inflated skins have long been in use as life-preserveds among different nations, and contrivances more or less ingenious to preserve the buoyancy of the body in case of accidental immersion in water, are resorted to in all countries. Whatever is lighter than water, if used on account of its buoyancy as a means of personal safety, may be considered a life-raft. See LIFE-BOAT; LIFE-PRESERVERS.

Life-rockets are projectiles to communicate between a distressed ship and the shore. These are especially useful where no life-boat can be had, or where it cannot be used on account of the roughness of the sea. They are available, however, only at moderate distances from the shore. By means of them a rope is thrown either from the ship to the shore, or from the shore to the ship, generally the latter, and when communication is thus established a slinging apparatus may bring the crew ashore one by one. Of the numerous projectiles for life-preserving purposes one of the simplest is the heaving-stick, which can be discharged by hand, but cannot be relied on for distances greater than 50 yards. A piece of stout cane two feet long, one end loaded with two pounds of lead, and the other attached to a thin line, is whirled vertically twice or thrice, and then discharged. Kites have been tried, but cannot be relied on with certainty, the most reliable missiles being those that are discharged from a mortar or gun by gunpowder, having a line attached to them. The first trial of this kind was made in 1791 by Sergeant Bell, of the English artillery, who fired his projectile from the ship to the shore, but it was soon perceived that it was better to fire from the shore to the ship. The life-mortar of Captain Manby was invented in 1807, and is practically still that in use, though variations in details have been made on it from time to time. His missile was a shot with curved barbs, resembling the flukes of an anchor, to grapple the rigging or the bulwarks of a ship. The shot was fastened to the rope by strips of rawhide. There was a contrivance for rendering the rope visible to the crew, and another to assist those on shore to descry the exact position of the ship in distress. The life-arrow, a cue-shaped stick of mahogany, with the thinner end projecting beyond the end of the barrel, is fired from an ordinary musket, and can carry 80 yards with a mackerel line attached.

The best lines are those made of loosely-spun Italian hemp. There are several ways of arranging the line so that it may run out quickly without kinking or entangling. Dennett's faking-box for this purpose is now generally adopted. The sling life-buoy is employed in conjunction with the rocket-apparatus. It is popularly known as the breeches buoy (q.v.).

In the United States the mortar is in general use at life-saving stations. At each station a cart is kept always ready packed with all the requisites for the rocket apparatus, and can thus be despatched at once on any emergency. Care is taken that the supplies are regularly renewed before the old are exhausted.

Life-saving Guns. See LIFE-ROCKETS.

Life-saving Service, United States, an important and effective branch of the public service, under the direction of the Treasury Department. The present system was inaugurated in 1871, by the present general superintendent, Sumner I. Kimball, then chief of the Revenue Cutter Service. In June 1878, by act of Congress, it was organized into a separate bureau. The service extends to the coasts of the Atlantic and Pacific, the Gulf of Mexico, and the Great Lakes.

The first life-saving stations in the United States were established by the Massachusetts Humane Society at Lovell's Island and Co-hasset. All efforts for saving life and property in cases of shipwreck were made by this society till 1837, when the President of the United States was authorized to employ ships to cruise along the shores and render assistance to distressed navigators. William A. Newell, afterward governor of New Jersey, witnessed a fearful shipwreck off Barnegat Island in which many bodies were washed ashore, and was so impressed by the sight that when he was elected to Congress in 1848 he introduced a bill for the relief of shipwrecked persons. The result of the passage of this bill was the placing of a few life-saving stations between Sandy Hook and Little Egg Harbor, N. J., and a little later a few stations were established on the coast of Long Island. Volunteer crews were depended upon at all the stations until the introduction of the splendid system which now extends along the entire coast and lake lines of the United States.

In 1903 there were 273 stations, of which 196 were on the Atlantic and Gulf coasts, 60 on the Great Lakes, 16 on the Pacific, and one at the falls of the Ohio, Louisville, Ky. During the fiscal year ending 30 June 1903, there were 697 disasters to vessels, 57 of which were totally lost. Of the 4,337 persons involved, 24 were lost. The value of property involved was \$9,051,150, of which \$1,169,105 was lost.

There are 13 districts in the service, over each of which is a district superintendent. There is also an inspector of life-saving stations at large, and in each district an assistant inspector, all being officers detailed from the Revenue Cutter Service. The business of the assistant inspectors is to look after the buildings, apparatus, drilling of the crews, etc., of their respective districts. Each station has a keeper who has six or seven surfmen under him. The keepers are all made inspectors of customs and so have legal custody of all property washed or brought on shore. The sta-

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tions, generally two-story buildings of six or seven rooms, are built at irregular intervals along the shore from 3 to 20 miles apart, according to the frequency with which vessels approach the land in their course. They are connected by telephones wherever practicable, and the distances between them are patrolled day and night. Each patrol carries a red Coston signal light, which he burns when a vessel is discovered in distress. On the Great Lakes the life-saving stations are kept open from the beginning of navigation in April to its close in December. On the Atlantic coast they are open from 1 August to 1 June, while on the Pacific coast they are open the year round. Each station is equipped with the life-boat (q.v.), guns, mortars, breeches buoys, and other devices for saving life and property.

HORACE L. PIPER,

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Liffey, lif'i, Ireland, a river which rises in county Wicklow, flows west into Kildare, then turns northeast and passes through the county and city of Dublin into the Irish Sea after a course of 50 miles.

Lig'ament, in anatomy, human and comparative, a band of white fibrous tissue which connects bones. To this class of tissue also belong the tendons or sinews of muscles, by which these structures are attached to the surfaces of bones. Ligaments differ from tendons in being of a stouter structure, and less liable to give way or to be ruptured. When ligaments break during life they seldom snap across or transversely, but generally tear in an irregular manner. Tendons, on the contrary, when subjected to great strains, break across. Ligaments possess little or no elasticity, and when stretched do not recover their resiliency. To the same class of structures as ligaments and tendons, the fasciae or sheet-like bands of white fibrous tissue spread over muscles and regions also belong. Microscopically examined, both ligament and allied structures exhibit sets of fibres arranged in parallel bundles, imbedded among which little nucleated bodies known as connective-tissue corpuscles are seen. These latter are minute corpuscles of various shapes, and their function has been assumed to be that of ministering to the growth and nutrition of the fibres amidst which they are placed.

Ligao, lē-gā'ō, Philippines, a pueblo of the province of Albay, Luzon, situated near the Inaya River, 22 miles northwest of Albay, the provincial capital, on the main road. It is in one of the best hemp growing regions in the archipelago. Pop. 17,900.

Lig'ature, in surgery, a cord, thread, bandage, etc., by means of which structures are tied or bound. A ligature is used for tying a bleeding artery or other vessel; for tying the pedicle of a tumor to prevent effusion of blood or other fluid after its removal; it may be tightly fastened round the base of a tumor to cause its subsequent removal by arrest of its blood-supply and consequent death. Thread of silk or hemp was formerly employed. Ligatures of animal material are now mostly used, catgut, silkworm gut, etc., also those of silver wire, and they are usually rendered antiseptic by steeping in carbolic acid or other antiseptic solution.

Ligature. See MONOGRAM.

Light. The word light is used in two distinct senses, namely, to designate the sensation which is characteristic of the organ of vision (q.v.), and also as a name for the usual cause of that sensation. This double meaning of the word would result in little inconvenience if there were always a definite relation between the sensation and its cause; but this is far from being true. For example, when we speak of white light, we may mean a sensation which is perfectly definite and familiar to all persons of normal vision, or we may mean that form of energy which can give rise to such a sensation. In this second sense the term is wholly indefinite, since there is an infinite variety of forms of energy which may give rise to the sensation of whiteness. The difficulty, which is a serious one in scientific language, may be avoided by restricting the use of the word to one of its significations, preferably to that of sensation, after the analogy of the use of the word sound. But such a restriction would not be in accordance with well-established usage, and it would necessitate the frequent employment of awkward circumlocutions. Another means of avoiding confusion is to so divide the subjects treated that the sense in which the word is used is unmistakable. This second method has the advantage of conciseness as well as that of being in accordance with the usage of most writers. The present article treats of light as a phenomenon of wave motion, wholly independent of the sense organ which betrays its existence to us. In it the eye is regarded as a simple optical instrument, quite like the photographic camera. This limitation admits of a satisfactory definition of the terms "white light," "yellow light," etc. Thus, by the former term we mean such waves as are emitted by a solid body at a very high temperature, as, for example, the incandescent lime in the lime-light. Any other kinds of waves, even if indistinguishable from these by the unassisted eye, are not white light. Again, yellow light, green light, etc., are the simplest waves which excite in a normal retina the sensations yellow, green, etc.

Theories Concerning the Nature of Light — It is now a little more than two centuries since the Dutch philosopher Huyghens published a paper in which he explained the familiar phenomena of light by waves in a medium that pervades all space and is called the luminiferous ether. His reasoning was so convincing, the explanations so simple, and the experiments supporting his views so apt, that except for the labors of the single philosopher then living who was greater than Huyghens himself, they could hardly have failed to receive at an early day the universal acceptance which they now command. Nine years earlier, in 1669, Newton had commenced his labors in the field of optics, by which, largely on account of fame and authority won in the domain of mechanics and astronomy, he established a theory of light which remained almost unquestioned for nearly a century and a half. Newton supposed light to consist in extremely small particles of matter projected from shining bodies with enormous velocities. We now know that this hypothesis was not only less fruitful than that of Huyghens, but, even with the comparatively limited range of optical

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phenomena known to Newton and his contemporaries, was also less probable.

According to this view of Newton, visual sensations are produced by the impact upon the retina of minute corpuscles emitted from luminous bodies which pass freely through transparent substances, differences of color being due to differing size in these small bodies. When these corpuscles approach the boundary of an optically denser medium, they are subjected to a force of attraction which causes them to deviate from their otherwise rectilinear paths. This is the explanation of the phenomenon of refraction. The secondary phenomenon of dispersion was very simple and naturally explained by an assumption that this attracting force varies with differing size. Singularly enough, the explanation of one of the most common phenomena, that of partial reflection at the boundary of a transparent medium, offered formidable difficulties: How is an attraction which is necessary to account for refraction also to act as an apparent repulsion for those corpuscles which are thrown back from the surface in reflection? This is a difficulty which the advocates of the Newtonian theory have never been able to meet in a satisfactory manner.

When Newton attempted to extend his theory to the explanation of the colors of thin plates, a subject which he was the first to investigate in a scientific manner, it was found even less satisfactory. He was obliged to supplement it with the highly artificial hypothesis that the corpuscles experience periodic changes in the ease with which they enter a refracting body. Even this addition to the theory fails to yield more than a rough approximation to an explanation of the phenomena, since the blackness of the central spot in Newton's rings apparatus, when the plates are brought into contact, is in contradiction with it. But it was only on account of a subsequently accumulated knowledge of optical phenomena which refused to adjust themselves to this theory, no matter how it might be modified, that its final overthrow came about. This not only required a long time, but also a champion of transcendent power to break with a system which had the force of tradition as well as the authority of the greatest of all philosophers to support it.

From 1704, the date of the publication of Newton's Optics, until 1815, the corpuscular theory was hardly questioned; at any rate, it reigned supreme in all treatises on light, and it was questioned only by a very few investigators who failed to acquire an influence that was anywhere decisive. In the latter year Augustin Fresnel, a young French government engineer, entered upon a career of scientific activity which proved of almost unprecedented brilliancy and success. Thus, as far as it bears upon the purely physical theory of light, may be regarded as completed in 1826. Beginning with a highly philosophical criticism of some of the accepted doctrines of optics, supported by the most apt appeals to ingenious experiments, he quickly extended his investigations until he embraced nearly all phenomena of light known to his contemporaries; and this with such success that he not only established as beyond question the essential truth of a wave theory but brought it to so high a degree of completion that his views were long supposed to be practically final. On

account of the importance of this work of Fresnel in the history of physical science of the past century, it is well worth while to briefly review its character.

The phenomena of diffraction first engaged the attention of Fresnel. It had long been known that the shadow of an opaque body cast by a point-source of light is somewhat different from what would be supposed from simple geometrical considerations, the difference consisting chiefly in an encroachment of the light upon the borders of the shadow. Newton, who called this phenomenon inflection, attributed it to an attractive force exerted by the opaque body upon the corpuscles while in its neighborhood, thus causing an inbending of their paths. Fresnel showed that this explanation was quite untenable, since the inflection caused by the back of a razor is exactly the same as that caused by the edge, although in the former case it is manifest that the time during which the corpuscles are subject to the deflecting force is far greater than in the latter. By similar appeals to ingenious crucial experiments he demonstrated that none of the current theories was sound; but far from resting here, he showed that all the observed phenomena could be perfectly accounted for in the undulatory theory of light, by an application of the principle of Huyghens. Extending this principle, so fertile in his hands, to wider fields in the domain of optics, he found in every case that the new method was adequate to yielding perfectly satisfactory results. With quite simple and natural hypotheses as to the conditions which must exist at the common boundary of two transparent media, he was even able to deduce quantitative laws governing the phenomena of reflection and refraction, which accord surprisingly well with experiments devised to test them.

A few years before the commencement of Fresnel's activities, Malus, while looking through a double-image prism, observed that the two images of a distant window which happened to be in such a position as to reflect light strongly to his eye, were quite different in brightness, and that under some conditions one image might entirely disappear. Further study showed that all ordinary transparent substances were capable of thus modifying light by reflection, and that the modification is complete at an angle which is simply related to the refractive index; moreover, that under the latter conditions the light would be transmitted through doubly refracting crystals in certain directions without bifurcation. Such modified light is called polarized light, and the phenomena thus briefly described are two of the simplest of an enormously extensive class, many of which are of extraordinary beauty. This discovery and those which quickly followed in the same field presented a host of new and difficult problems to physicists. Of the many active and able workers in this domain Fresnel was easily the leader. In a very few years he had proposed and developed a general theory of light which embraced these new phenomena and which stood almost unquestioned until our own day; and even now the most essential principles of his theory are wholly unshaken. In its barest outlines the theory may be described as follows: Fresnel assumes that the motion of the particles which constitutes the vibrations of light is always in a direction at

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right angles to the line of propagation of the waves. When the paths of the particles are quite irregular or without order, the light is ordinary light; but when the paths are similar, whether straight lines, ellipses with their axes parallel, or circles with a common direction of motion, the light is said to be polarized. From this simple hypothesis he succeeded in erecting an extraordinary structure which harmonized and explained nearly every known phenomenon of light in a manner that until the most recent times practically withstood all destructive criticism. Even recent achievements in this field of science have been supplementary to, rather than subversive of, Fresnel's general work. Of the phenomena known to his contemporaries, that of dispersion alone was unconsidered by him, a phenomenon which obviously depends upon the ultimate molecular structure of the refracting substance and which has recently been reduced to comparatively simple laws. This great work of Fresnel was looked upon, as indeed it well deserves to be, as one of the greatest monuments to the human understanding—comparable to Newton's doctrine of universal gravitation—and it long remained of almost unquestioned authority. Ultimately, however, one of its fundamental postulates, namely, that the vibrations are always at right angles to the direction of the motion of the light, began to give rise to difficulties. The fact also that the theory could not determine specifically whether the direction of vibration of plane polarized light is in the plane of polarization or perpendicular to it was not only a manifest incompleteness, but it was a constant stimulus to a critical inspection of its premises. The more these points were studied the more insoluble the difficulties appeared, until there came to be a tolerably widespread belief that the theory was not only incomplete, but that in some way it must be essentially in error. To acquire a notion of what modern science has done to clear up these points, we must first review a class of phenomena which seem to be totally unconnected with optics, but which in the end will afford a very remarkable example of the tendency of all science toward unity.

In 1845 Faraday discovered that if polarized light is passed through a transparent substance in a magnetic field and in the direction of the field, the plane of polarization is rotated. The amount of rotation for a given substance is found to be proportional to the strength of the magnetic field and to the length of the path in the material. As many substances, such as turpentine, a solution of common sugar, quartz crystals in the direction of their crystalline axes, etc., present us with a similar fact, this would not be so surprising save for a remarkable difference in the two cases which may be thus described: When the plane of polarization is rotated by passing through a sugar solution or a similar body, and the transmitted light is reflected back upon its course so as to retrace its path, it is found that the original angle of polarization is perfectly restored by a precisely equal rotation in the opposite direction in the return; but a similar experiment upon the body giving the magnetic rotation shows a doubled change of angle. This indicates that, although in the first case we must explain the rotation by the molecular constitution of the material, we are not permitted to suppose that the mag-

nctic field has produced a similar molecular structure in the second case, since the rotation is constant in direction irrespective of the direction of motion of the light. Of course, from the known nature of magnetism, this is equivalent to asserting that there must be some relation between light and electricity. But this is not the most obvious connection between these two classes of phenomena, for as we now know, the earliest division of materials in accordance with their electrical properties involved a classification according to their most characteristic optical properties also. Thus all conductors of electricity, excepting only those liquids which undergo a chemical decomposition when they transmit an electrical current, and therefore belong to an obviously different class, are extremely opaque to light; conversely, all substances which are good insulators are also transparent to light, at least to an extent which would make a sheet a few hundred-thousandths of an inch in thickness appear perfectly transparent, although such a sheet of metal or similar conductor would not differ greatly in opacity from a thick plate. An excellent illustration of the generality of this law is furnished by the element carbon, which in the dense opaque form—like graphite, for example—is a very good conductor of electricity, but in the form of the transparent diamond is an insulator.

Before the middle of the 19th century two methods of measuring electrical magnitudes had been developed; one of these is based upon the repulsion which exists between two electrically charged bodies, and the other upon the repulsion which exists between two similar magnet poles. Elaborate and repeated investigations have demonstrated that if a given electrical magnitude is measured according to one of these systems, and the value thus found is compared to a measurement of the same quantity in the other system, the ratio involves a velocity only. This statement is quite independent of the kind of magnitude chosen for the experiment. Within the limit imposed by unavoidable errors of observation the value of this velocity always appears to be the same as the velocity of light.

Here, therefore, are three distinct relations between light and electricity, which have long been known and to no one of which it is possible to attach any *a priori* reason. It was left to Maxwell to illuminate this obscure field. His long and successful investigations in electricity and magnetism, especially his efforts to reduce Faraday's brilliant discoveries to correlation and to a consistent scientific statement, led him to the conclusion that light itself consists of electrical vibrations. He attempted to test the validity of this hypothesis by every means at his command. For example, according to his theory a non-magnetic substance ought to have a dielectric constant, or what Faraday named its specific inductive capacity, equal to the square of its index of refraction. This indicated relation was found to hold with all expected precision in some cases, but to be widely removed from the truth in others. Again, since, according to the theory, only those substances are transparent which will offer a resistance to the motion of electricity within them analogous to elastic reaction, there ought to be a determinable relation between electrical conductivity and opacity. Maxwell attempted to find this rela-

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tion in the case of gold-leaf, which is sufficiently thin to transmit a measurable portion of the light falling upon it. Notwithstanding that the discrepancy was here found disappointingly great, the gradual accumulation of knowledge of the more recondite phenomena of the electrical field had led the great majority of physicists to the conclusion that Maxwell's theory was at least a close approximation to the truth, and accordingly one of the most brilliant discoveries of the 19th century. This may be regarded as a fair statement of the attitude of the world of science in 1888, when Hertz, a German physicist, made a series of remarkable experiments which have eliminated all possible doubt as to the essential verity of Maxwell's theory of light. Fortunately it is not difficult for us to gain a sufficient knowledge of the character of these experiments to make clear their general bearing.

It had long been known that a Leyden jar suddenly discharged through a thick wire gives rise to an oscillatory current of very brief duration, and that in certain simple cases the period of the oscillations can be calculated with considerable accuracy. Hertz recognized that during the time of discharge such an electrical circuit must be a source of oscillatory changes in the magnetic field, which, if the views of Maxwell are in accordance with fact, should be propagated through space with the velocity of light. Although it is difficult, if not quite impossible, to measure directly this velocity, if one knows the wave-length and the period it is perfectly easy to deduce the velocity from these two elements, since in its period every wave moves a distance equal to its own length. In these experiments the period was calculated from the elements of the electric circuit; it only remained therefore to determine the length of the waves. Hertz accomplished this in the following simple and ingenious manner: At a considerable distance from the source of the waves he placed a large sheet of metal perpendicular to its direction from the source. From this sheet the waves were returned upon themselves by reflection. Now, a well-known fact in wave motions is that when two systems of waves of like period are moving in opposite directions, they combine to form a system of standing waves of half the length of the free waves. The regions where motion is destroyed by this kind of interference are called nodes. Hertz demonstrated the existence and position of these nodes by means of an apparatus which possessed the same electrical period as the source. This apparatus he called a resonator. The value of the velocity of these waves deduced from his observations differs no more from the known velocity of light than would be expected from the unavoidable errors of observation; thus it complies with the requirements of Maxwell's theory. These waves, therefore, are shown to differ from light waves only in their enormously greater wavelengths, and that they must be subject to all the established laws of optics which are independent of the length of the waves. The last conclusion was thoroughly tested by Hertz by a series of most interesting and convincing experiments. He found that strictly according to the laws of optics these waves are reflected from the surfaces of all bodies which conduct electricity; that they readily pass through substances which

behave as insulators; and that in passing from one insulating medium to another the direction of propagation is altered in accordance with the law of sines. Further than this, he showed that such electrical waves admit of polarization, and they are therefore characterized by motions at right angles to the direction of propagation. During the time which has elapsed since these investigations a host of experimenters have improved the methods and apparatus of Hertz, and have largely extended the range of wavelengths that can be observed. On the other hand, many investigators have been employed in the application of analysis to both the old and the new problems in optics. The difficulties which attach to Fresnel's mode of regarding the optical phenomena of crystalline media are found to disappear, and all the complex phenomena of light admit of explanation from a consistent body of premises.

Reflection—Refraction—Dispersion.—When light waves originating at a point fall upon a surface separating two media, the system of waves is broken up into two systems, one of which remains in the first medium, though moving in a changed direction, and the other entering the second medium. The former system constitutes reflected light, and the latter, also in general changed in direction, is called refracted light. If the bounding surface is smooth the phenomena of reflection and of refraction are regular and the modified paths of the light can be calculated. The total intensity of the reflected light varies greatly with the nature of the media on either side the interface and also upon the angle at which the wave surfaces meet this surface. If we consider only the case of the first medium being air, we may describe two general cases of interest. (1) If the second medium is a transparent substance, like most liquids, ice, glass, etc., the reflected light is ordinarily of small intensity as compared to the incident light, but increases with increasing angle of incidence, until, as this angle approaches 90° , the rate of increase becomes very great. (2) If the second medium is a metal the reflected light is ordinarily a large portion of the whole, but its intensity does not vary greatly with the angle of incidence. Turning now to a consideration of the light which passes the interface and enters the second medium we find that in some substances these waves will go a great distance without notable diminution of intensity. Such substances are called transparent. In others, described as opaque, the light waves are converted into other forms of energy in longer or shorter distances, and are destroyed as light. In the case of metals and other good conductors of electricity this destruction follows a penetration of only a few millionths of an inch. The laws which determine the directions of the reflected and refracted light are simple. Calling the angles which the incident waves, the reflected waves, and the refracted waves, make with the surface separating the two media, the angles of incidence, of reflection, and of refraction, respectively, we have for the law of reflection the angle of reflection is equal to the angle of incidence, and for refraction, the sine of the angle of incidence divided by the sine of the angle of refraction is equal to the velocity of propagation of the waves in the first medium divided by the velocity in the second medium. These laws are

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not absolutely without geometrical ambiguity, but are made so by the addition that the change of direction in both cases is the least possible. If the refracted light is observed critically it will be found that the direction varies somewhat for lights of different colors, so that, if white light is incident, the light will be arranged in direction according to its component colors, the red being least changed, then yellow, green, blue, and, most of all, violet. This phenomenon is called dispersion. Since the maximum difference of deviation for small angles of incidence is never more than a small part of the whole—very few substances exhibiting a ratio greater than one twentieth—dispersion should be regarded as a secondary phenomenon of refraction.

Optical Images—Optical Instruments.—When light waves originating at a point are modified by one or more smooth surfaces—either by reflection, or refraction, or by a combination of the two—so that after these modifications they either pass through a new point or seem to do so, this new point is called the optical image of the first. To distinguish the cases of real points from those which only appear to be new centres the terms real image and virtual image are employed.

If an optical system can form an image, real or virtual, of a point, it follows from the law of continuity that it will also form simultaneous images of near lying points with a like degree of precision; the images of remoter points, however, may be, and in general will be, imperfect. The simplest of all optical systems is a plane mirror, and it is the only optical instrument which is absolutely perfect, provided only that it is not of too small dimensions. Such an instrument forms virtual images of all points in front of it, the sources and images being symmetrically placed with reference to the plane of the mirror. Bodies of transparent substances bounded by smooth curved surfaces, ordinarily spherical surfaces, are called lenses. Almost all optical instruments employ lenses for producing the required modification on transmitted light. If a lens increases the curvature of the wave-surfaces which pass through it—which in general requires the middle of the lens to be thicker than its periphery—it will produce real images of remote objects near its geometrical axis. Such a lens is called a *positive-lens*. A screen to receive the images and an opaque enclosure to shield it from extraneous light constitutes the important instrument known as the camera obscura. One of the earliest optical instruments invented, it has only been of importance since the discovery of a method of fixing the images a short time before the middle of the last century. The requirements of modern photography, especially the demand for brightness and wide angular extent in the images, have led to inventions of wonderfully complex camera lenses, so that ordinarily they are made of combinations of from four to ten different lenses, involving two or three different kinds of glass in their construction.

The eye is properly a camera obscura, in which images of objects neither too near the observer nor too far from the axis of vision are formed upon the retina as a screen. The most important difference between the eye and the photographic camera lies in the fact that the

interior of the eye is filled with a substance optically different from air, which introduces some remarkable modifications in the phenomena of vision. These may be ignored in this casual review of the construction and function of optical instruments.

In almost all optical systems, excepting the camera obscura, the eye is a necessary part in use, and it is therefore convenient to specify the conditions under which distinct vision is possible. To a normal eye, any object very near the axis of vision can be distinctly seen if it lies at a distance comprised between five or six inches for a nearer limit and infinity for the farther. Thus, the moon and a printed page held at the customary distance for reading can be seen equally distinctly. We shall assume a distance of 10 inches as a standard of comparison.

Microscope—Telescope.—If a small object be brought quite close to the eye it will appear larger, but when too close vision will be indistinct. This is because the refractive power of the eye is insufficient to cause the light waves to form new centres at the retina; but if the refractive power of the eye be suitably increased by the aid of a positive lens placed between it and the object, vision is rendered distinct with the increased apparent size. A lens so used is called a simple microscope and the ratio of the apparent diameter of the object to that which it would have at the conventional distance of 10 inches is called the magnifying power of the microscope. Since nature presents us with innumerable examples of such microscopes in small drops of water, of transparent resins, etc., the phenomenon has doubtless been known since prehistoric times, and we have the best of reasons for believing that some of the artisans of antiquity employed magnifiers as aids in their work.

There is no theoretical limit to the magnification attainable with simple microscopes except that set by the nature of light itself, but very high powers demand inconveniently small lenses and such close approximations to the eye that illumination of the object becomes difficult. These difficulties can be greatly reduced by employing two systems of positive lenses, one of which serves to form a *real* and enlarged image of the object, while the other is a simple microscope used to observe the real image quite as if it were the object itself. The former system is called the objective, or object-glass, and the latter the ocular, or eyepiece. The instrument thus constituted is called the compound microscope, and its magnifying power is equal to the product of that of the objective into that of the ocular. The compound microscope was invented about the middle of the 17th century, but it was not perfected so as to be of real value as an instrument for scientific research until after the second decade of the 19th.

If a lens, or lens system, is employed to form a real image of a distant object and this image be viewed through a microscope, the combination forms a telescope. Since the real image is in general inverted, the object appears inverted to the observer if he employs a simple magnifier as an ocular, but it appears erect if the ocular is a compound microscope. The inverting telescope is optically superior and is universally used for astronomical observations,

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but for terrestrial observations the second type is ordinarily preferred, which, when it is desired to distinguish it by a name, is called a terrestrial telescope, or a spy-glass. The terms objective and ocular are also applied to the two lens systems in the telescope.

Since concave mirrors can also produce real images of distant objects they may be used in place of the objective. Such instruments are called reflecting telescopes; they have been very extensively used for astronomical purposes in the past.

Achromatism—Achromatic Combinations.—Newton was led by his experiments to conclude that the secondary phenomenon of dispersion bears a constant ratio to the refraction. It follows from this that a separation of composite light into colors is the inevitable concomitant of change of direction by refraction, and that this imposes a somewhat narrow limit upon the power of all optical instruments involving refraction. This belief led him to invent the reflecting telescope, which remained the leading form for astronomical purposes for more than a century. About the middle of the 18th century, however, Dolland found that Newton's conclusion was founded upon too limited a range of experiment and showed that it is possible, by a combination of two or more materials, to secure a change of direction of light by refraction with little or no evident dispersion. Thus, he found that a prism of crown glass, say of 10° , combined with a prism of flint glass of 5° , turned in an opposite direction, would yield a deviation nearly as great as a prism of crown of 5° and without the colors of dispersion. Such a combination is called an achromatic combination, and a pair of lenses similarly combined to give colorless images, is called an achromatic lens. All refined optical instruments utilize this invention of Dolland. In telescopes the objective ordinarily consists of two members only, a positive crown lens combined with a negative (diverging) flint lens; in microscope objectives there are rarely less than four lenses, and sometimes, in the case of very high powers, not less than ten.

Interference Phenomena—Diffraction.—That light is in fact some form of wave-motion does not appear from the phenomena of reflection and refraction in their commoner manifestations, although if the acting surfaces are made very small there are deviations from the simple laws given above which inevitably lead to a wave theory for an adequate explanation. For the present purposes it seems far better to describe some of the simpler and easily produced phenomena which demonstrate the wave-motion.

One of the most striking properties of all varieties of waves is their propagation independently of the state of motion of the medium in which they exist, for example, water waves of all possible lengths and having all possible directions of propagation may coexist on a single surface of water. In familiar acoustic phenomena we have excellent analogies which will greatly help in the comprehending of the less familiar optical phenomena. If two tuning-forks of exactly the same pitch be sounded together it is found that there are regions where all evidence of sound vanishes, provided that the forks are equally loud. These regions of silence are those where the maximum of density due to one set

of waves corresponds with the minimum of the other set, and they are so simply related to the positions of the two forks that having established their places, it is easy to deduce from the geometrical relations the length of the waves. Could we get two sources of light which emitted waves exactly alike, there should be corresponding regions where illumination from the two sources would be wanting, provided that light is in fact produced by a wave-motion. Since, however, the ultimate sources of light are the molecules of luminous bodies and we are unable to control such small bodies, so simple a test is impossible; but a perfect optical image of a source is exactly like the source itself, hence, if light is allowed to fall upon a screen and a portion of the same radiation is reflected by a mirror upon the screen, the conditions for interference are met. The experiment is a delicate one and liable to escape observation, only, however, because of the shortness of the waves. Fresnel tried the experiment, not only by using two mirrors, enclosing an angle a very little less than 180° , but also by using two prisms of very small angle, with complete success. The advantage of using a pair is obvious when similarity of the two sources—here two virtual images of the same source—is considered. His measurements showed that the waves which are found in ordinary white light have all lengths between those of $\frac{1}{1400}$ and $\frac{1}{1500}$ of an inch, the former being that of the extreme red of the prismatic spectrum, and the latter of the extreme violet. The mean value for white light may be taken as $\frac{1}{1450}$ of an inch.

A much easier, though less simple, method of exhibiting interference phenomena is the following: If a hole, less than $\frac{1}{10}$ of an inch in diameter, be pierced in a piece of paper, a distant bright point, such as an arc light or the bright point of a mercury thermometer-bulb in sunshine, will appear to an eye looking through the hole as a disk surrounded by one or more concentric rings. If now a second similar hole be made within less than $\frac{1}{10}$ of an inch from the other and the experiment be repeated, the disk will appear brighter and traversed by a series of dark lines perpendicular to the direction of a line joining the two holes. These dark lines mark the regions of complete interference and are exactly like the dark bands produced by Fresnel's method. The fact that the point-source of light appears as a disk of appreciable magnitude is also explicable by the fact that light is a wave-motion. Broadly stated the condition is this: if light consists of waves, we ought not to expect that the laws of reflection and of refraction will hold unmodified when the acting surfaces are no longer large with respect to the length of a light-wave. These deviations from the laws are called diffraction.

Since most of the light with which we ordinarily experiment is composite, that is, made up of a combination of many different wave-lengths, the places of complete destruction of illumination differ for differing wave-lengths. Such phenomena are therefore generally, sometimes splendidly, colored. Familiar cases of simple interference are presented by thin reflecting plates, such as soap-films, rifts in transparent media, as in precious opal, etc. In these cases we have the two sources produced by reflection from the two sides of the plates, and the phe-

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nomena are generally known as the colors of thin plates, first studied by Newton.

Diffraction phenomena are even more commonly seen. The peculiar lustre of satin spar, of the gems known as cat's-eye, and of the star sapphire, find their explanation here. The iridescence of mother-of-pearl and of certain feathers, and the brilliant colored pattern seen when an electric arc light is viewed through a fine and uniform fabric, like silk or the web of many feathers, are diffraction phenomena of greater regularity than the former group.

Optical Phenomena of the Atmosphere.—Of the many optical phenomena which belong either to the air as a transparent body or because of foreign bodies temporarily suspended in it, mirages, coronas, rainbows, and halos are among the most striking. The refractive power of the air increases with its density, and, as this is increased both by pressure and by lowering of temperature, there results varying effects of refraction. With the normal condition of the air, in which the density decreases in a geometrical ratio as we rise above the surface of the earth, the only very obvious effect is to prolong the length of the day to twice the time which it requires the sun to sink at the horizon by its own diameter. Atmospheric dispersion is also present, but is not sufficiently marked to be detected by the unaided eye, although conspicuous enough with a telescope under favorable conditions. The scintillation of the stars, however, is a direct effect of atmospheric dispersion.

In the not infrequent cases when the air departs widely from the normal law of continuous decrease of temperature with increasing height above the surface of the earth, the paths of the light waves which are nearly horizontal may change the direction of curvature between the object and the observer, in other words, may have points of inflection. In low latitudes the prevailing condition, when such abnormal refraction may be observed, corresponds to a lower layer of air at a higher temperature than that immediately above. In such cases distant objects near the horizon appear lifted above their real positions and portions of these much elongated vertically. A further development shows inverted images, generally without much distortion, underneath the raised images. Over sun-heated plains the inverted image is that of a portion of the sky, whence the effect of a sheet of water between the observer and the horizon. In high latitudes it is sometimes possible to find the condition of a layer of much cooler air in contact with sheets of ice or of cold water, in which case the inverted image is seen above the erect image. These phenomena are known under the name of mirage.

When the atmosphere is not quite clear one may sometimes see colored circles concentric with the sun or moon, generally not more than four or five times the diameter of the sun, and invariably having the inner edge blue. Such circles are called coronas. They are diffraction phenomena produced by very small spherical drops of water suspended in the air, and their diameters are in an inverse ratio to the diameter of the drops to which they are due. The only necessary conditions for well developed coronas are smallness and general uniformity of size in the drops.

When sun-light falls on drops of water which are not small compared to the length of a light

wave, an entirely different phenomenon, involving reflection, refraction and dispersion, results. It can be shown that, when flat wave-surfaces of light enter a sphere of water, there are two cases in which a portion of the wave emerges from the drop still nearly flat, and that in these directions, therefore, the light will be transmitted with relatively great intensity. The first case corresponds to refractions at entrance and emergence with a single interior reflection; and the second case to the two refractions separated by two interior reflections. The total change of the direction of the light in the former case is 138° , and in the latter, 231° . It, therefore, follows that all drops at these two angular distances from the sun should appear relatively bright, in other words, that opposite to the sun there should appear two concentric circles under proper conditions of illumination, one, much the brighter of the two, of 42° radius, and the other of -51° radius. The secondary phenomenon of dispersion causes these angles to vary continuously for different wave-lengths, hence the circular arcs, constituting the double rainbow when perfectly developed, appear as bands of prismatic colors. It is not difficult to see that the primary bow, often the only one which can be traced, must be red on the outer border, whence we conclude from the algebraic sign attached to its radius, that the secondary bow should present the red border on the inner margin.

When the temperature is low, water cannot exist in the form of drops, but only in that of snow crystals and of a perfectly transparent vapor. On those occasions when there are numerous ice crystals of very regular form suspended in the air and illuminated by the sun or the moon, we may see one or more of a series of highly complicated phenomena which bear the names of halos, parhelia, sun-dogs, etc. A bare description of all the features which have been observed and recorded would demand far more space than is available; only the most common ones can be noted here. The simplest form of ice crystals, and the only form which is necessary to produce all the known forms of halos, is that of a right hexagonal prism. Such a body supplies two refracting angles, namely, that of 60° contained between two alternate faces of the prism, and that of 90° embraced between each of these faces and a base. As light traversing a 60° prism of ice has a minimum deviation of 22° , if there are present a sufficient number of such prisms between the sun or moon and the observer, the luminous body would seem to be surrounded by a concentric circle of 22° radius, having, on account of the secondary effect of dispersion, a red inner margin and a pale bluish outer one. Similarly the rectangular edges would give rise to a colored circle of 44° radius. The smaller circle can be seen very frequently — perhaps on sixty to eighty days a year in our latitude — while the 44° circle is rarely seen.

When the length and width of a small hexagonal prism differ greatly, it will not remain while falling through quiescent air in a purely chance position, but it will set itself more or less perfectly in a definite position with respect to a vertical. Thus a flat prism will fall with its base horizontal, and an elongated crystal will maintain its axis nearly horizontal. This peculiarity in falling crystals produces a large number of features in complicated halos which are

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generally recognizable because they are all symmetrical with respect to a vertical circle passing through the sun. Some of these are comparable with the most brilliant rainbows in their coloring. The most familiar of this class of phenomena are the two bright prismatic spots to the right and left of the sun respectively, having the same altitude as the sun and their red side turned toward the sun. When the sun is very low they are 22° distant and appear merely as bright portions of the inner halo, but as the altitude of the sun increases they increase their angular distances, and above a moderate altitude they disappear. These spots are called parhelia, or sun-dogs; they are sometimes the only feature of the halo visible and are by no means infrequent. See also CAMERA; ELECTRICITY; ELECTRIC LIGHT; MICROSCOPE; OPTICS; TELESCOPE; VISION.

CHARLES S. HASTINGS,
Sheffield Scientific School, Yale University.

Light, Therapeutics of. In medicine light has been used from the earliest times, and the therapeutic application of sunlight is an empirical mode of treatment, in many diseases, which has been handed down through generations. Only in recent years, however, have more definite forms of light-therapeutics been applied, but with the discovery of the X-ray by Röntgen began a new era. The reaction of the human body to different forms of light is very striking, and however various the sources of light, the mode of reaction is often marvelously similar. Thus, the surface capillaries of the skin are dilated, there is exudation of serum into the subcutaneous tissues, and the nerve-endings are stimulated. The results of the application of light widely vary, the variations depending upon the area exposed and the part affected. There is one form of sunburn resulting from direct action of the rays of the sun, and similar burnings have been produced by X-rays and by means of radio-active substances.

At the present time sunlight is used as a general tonic, and as a special tonic to the skin, while as a disinfectant its powers are systematically applied. Modified electric light, X-rays, and radio-active substances are now extensively employed in the treatment of certain forms of new growths of the skin and of the interior body. Lupus is readily cured by means of the Finsen light, and superficial forms of cancer of the skin, and even cancers of internal organs have been cured by means of the X-ray. The X-ray, moreover, produces marked stimulation of the skin, with sweating and at times loss of hair, so that it may be used as a depilatory agent. It is not unlikely that the applications of the X-ray and of radio-active bodies, such as radium, polonium, uranium, etc., will within a few years undergo profound modifications. The study of scientific radiotherapy is only in its infancy. See RADIUM; X-RAY.

Light of Asia, The, a noted epic poem by Sir Edwin Arnold, published in 1878 in eight books. It attracted general attention at its first appearance and familiarized the average reader with the teachings of Buddha. The poem is smoothly written, with not a little beauty of description and movement, but is not the great work its early admirers imagined. The poem has been translated into many languages.

Light That Failed, The, a novelette by Rudyard Kipling (q.v.), published in 1890; the first long story written by this author. The story was dramatized and received its first presentation in 1903, Forbes Robertson appearing in the title-role.

Light-Horse Harry. See LEE, HENRY.

Lighter, a flat boat or barge for transporting merchandise on rivers and canals, and to and from vessels moored in a stream, or where they cannot be laden from or discharged on to a wharf or pier alongside.

Lighthouse, a structure on some conspicuous point of seashore, island or rock, or on the bank of rivers and lakes, from which a light is exhibited at night as a guide to mariners. Lighthouses are generally placed on salient points, each requiring structures specially designed to meet the exigencies of varied sites. When placed on headlands or large islands lighthouses are very much alike in general features, the differences being mainly in the height of the towers, depending on the distance at which the light requires to be seen, and the lighting apparatus. Towers erected on isolated wave-swept rocks in the open sea, such as the Eddystone (now superseded by Sir James Douglass' tower), the Bell Rock, Skerryvore, and Chickens Rock lighthouses, in Great Britain; the Minot's Ledge and Spectacle Reef in the United States, and Bréhat in France, are triumphs of engineering.

History.—The history of lighthouse building and illumination may be said to extend over a period of more than 2,000 years; but the regularly organized life-preserving system of modern lighthouse engineering goes back very little further than the beginning of the 19th century. None of the early lighthouse buildings now exist. The Pharos of Alexandria (331 B.C.) gave its name to its successors. The Romans built lighthouses at Ostia, Ravenna, Puteoli, and other ports. The Phoenician Pharos at Coruña was repaired during the reign of the Emperor Trajan, was re-established as a lighthouse about 1634, and in 1847 had a dioptric apparatus placed in it. On the cliff at Boulogne there are the remains of a lighthouse ascribed to Caligula (40 A.D.), and at Dover there are remains of another Roman Pharos. Until the end of the 18th century the lighthouses of Great Britain and the United States were few in number, and of an inferior description in the great essential of a lighthouse, namely, sending the greatest number of rays of light toward the horizon. Many of the public lights in England were private property, as was also the case with the Isle of May in Scotland, the patent for which was ratified in 1641. There were only 25 lighthouse stations and six floating lights in England at the beginning of the 19th century. The coast and harbor lights in Great Britain and Ireland are now upward of 880 in number. In the United States of America the first act of Congress relating to lighthouses was passed in 1789, and there are now in American waters over 3,000 lights and light-ships and 246 fog-signals.

The early lighthouse towers had on their summits grates or chauffers, in which billets of wood or coal were burned, but though expensive to maintain—some of them using 400 tons

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of coal yearly—were uncertain in their appearance, varying with the ever-changing character of the atmosphere. Such coal-lights survived in Scotland till 1816, in England till 1822, and on the Baltic till 1846.

Construction.—The difficulties of building are very great, as may be judged from the following facts: Winstanley's Eddystone took four years to erect, and was finally swept away; Rudyerd's and also Smeaton's Eddystones took each three years, the Bell Rock took four years, the Skerryvore five, and Dhuheartach three and a half, the great difficulty being to effect a landing of men and material. At Minot's Ledge, off the Massachusetts coast, General Alexander got only 30 hours of work in the first year, and 157 in the second, and the histories of the Bell Rock, Skerryvore, Dhuheartach, Chickens, Eddystone, and some others tell the same tale. The cost of lighthouses may vary much; for instance, the Bell Rock cost \$310,000, Skerryvore, \$430,000; Spectacle Reef, on Lake Huron, \$300,000; and it will be easily seen that an ordinary land station, fully equipped, will cost much less—as a matter of fact, about \$25,000 to \$50,000. Light-vessels cost about \$45,000.

These towers are constructed of steel, or hard stone, such as granite, or cement-concrete faced with hard stone, and of such a mass and strength as to prevent their being overturned or destroyed by the waves. A typical stone lighthouse is built of granite, say 140 feet in height, with a diameter at the base of 42 feet and at the top of 16 feet, and contains 58,580 cubic feet, or about 4,308 tons of masonry. A staff of four light-keepers is attached to such rock lighthouses, three residing in the lighthouse and one on shore, the reliefs being fortnightly, so that each man has six weeks on the rock and two weeks ashore. At land lighthouse-stations, where women and children can be stationed, the keepers' families reside with them, and the staff consists of three men when there is a fog-signal, and two men when there is only the light to attend to. It is considered essential that a constant watch be kept in the light-room during darkness to ensure the proper exhibition of light.

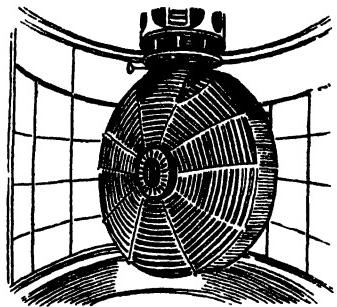
Optical Apparatus.—The object of using optical apparatus in a lighthouse is to direct, as far as possible, all the rays of light that proceed from the *radiant*, or source of light, so as to be visible only on the sea between the near sea and the sea horizon. In the Eddystone lighthouse, up to the commencement of the 19th century, the lighting apparatus consisted of a chandelier of tallow candles, though parabolic reflectors made of facets of silvered glass mirror, set in a mould of plaster of Paris, were introduced in 1768 and used in several lighthouses, the effect of these reflectors being to concentrate and throw seaward the rays of light from a flat-wick lamp placed in the focus. At a later date reflectors composed of sheet copper, plated with silver and formed into a parabolic curve, were largely introduced and are still in use. These reflectors, where a fixed light was desired, were arranged in two tiers on a frame, as many as 26 being necessary to show a light of equal power all around the horizon, and in the case of flashing lights seven were grouped on each of four faces of a frame that was

rotated by clockwork. This mode of lighting is termed *catoptric* or reflecting system. The method of building lenses of separate rings or prisms of glass, so as to form a larger lens than could be obtained from a mere bull's-eye formed of one piece of glass, was first adopted for lighthouses in 1822. For a fixed light the built-up lens was so arranged as to form a polygon with one burner in the focus, and for a flashing light annular lens panels were grouped round the one central burner and revolved by clockwork. In 1892 Charles A. Stevenson made the lenses spherical in form in the vertical plane, and in 1895, with great advantage to the power of the light, abolished the old section of the elements and gave them an equiangular section. This equiangular profile also permits of the refracting elements being extended to 80° of focal opening, and indeed farther, without loss of efficiency. The setting of lenses eccentrically has rendered possible a diminution in the diameter, and consequent saving in cost of lantern and tower. Besides the fixed-light apparatus and the lens panels many other forms of prisms for various purposes have been introduced. Thomas Stevenson's catadioptric mirror, formed of totally-reflecting prisms, and subsequently improved by James I. Chance, is largely used; and vertical straight prisms, placed in front of either fixed light or holophotal panels, are used to deviate the light azimuthally over particular arcs where the light is required. The desire to increase the power of the lights induced some lighthouse authorities to advocate the use of larger burners without increasing the focal distance of the apparatus, with the result that little advantage was gained, as most of the light was ex-focal. It was not, however, till 1885, that the first *hyper-radiant* lens was constructed, with the result that when tested it was found to produce a beam twice as intense as that from the previous lenses with the same large burners in the foci. This hyper-radiant lens is now largely used where great power is desired. See PLATE.

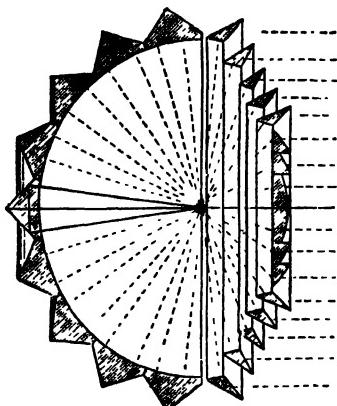
Radians.—The radians used in the focus of the apparatus in foreign lighthouses are generally 1-, 2-, 3-, 4-, 5-, 6-, or even 10-wick cylindrical paraffin burners, though gas burners, incandescent burners, and the electric light, both arc and incandescent, are also in use. The use of paraffin resulted in a large saving. The electric light is now generally used in the United States. The popular idea that the electric light is not so good in fog as oil or gas lights was confuted in 1885, when it was found that oil and gas were equally affected by atmospheric variations, that the electric arc light is absorbed more largely proportionately to its initial power by haze or fog than oil or gas lights, but that in all weathers and at all distances its penetrative power was found superior to the gas and oil lights, and that all three are nearly equally affected by rain. These results are confirmed by practical experience in our lighthouses.

Characteristics.—To enable the sailor to distinguish one lighthouse from another, lights in proximity to one another are arranged to exhibit different characters. The characters in common use are: fixed light; flashing light, showing one flash at regular intervals of a few seconds; group flashing lights, showing two or more

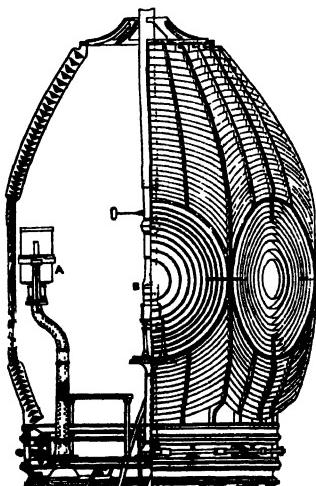
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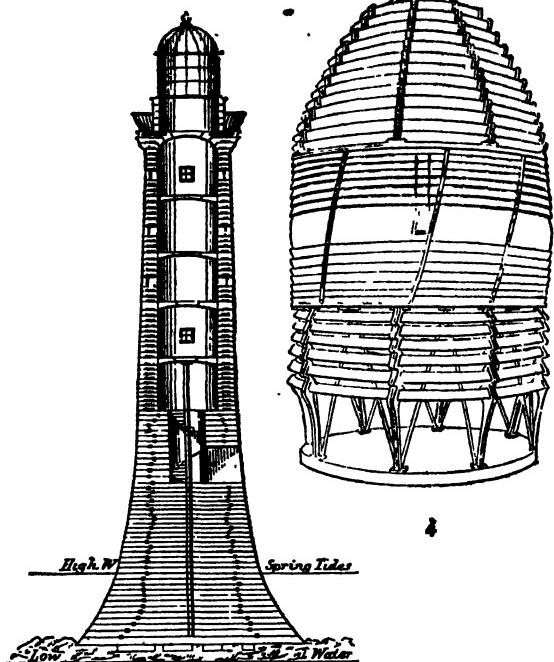
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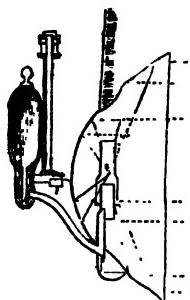
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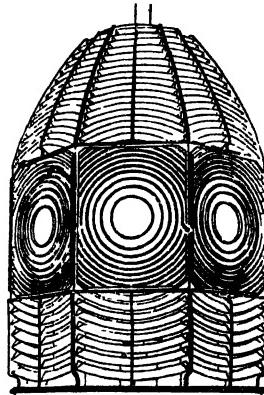
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- 1. New revolving light, Barnegat, N. J.
- 2. Holophotal univalve apparatus with dioptric mirror
- 3. Sectional plan of Bell Rock Tower.
- 4. Fixed dioptric light.
- 5. Parabolic reflector with oil-fountain lamp.
- 6. Elevation of triple-flashing apparatus.

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flashes in quick succession, followed by a longer period of darkness than that which separates the flashes; occulting lights, which show a fixed light and are eclipsed for a few seconds at regular intervals. Colored lights, red and green, are also used with any of the foregoing characters to produce further distinctions, but in general only to mark danger arcs, or in conjunction with a white flash, as the tinted-glass shades interposed to produce the desired color seriously cut down the power of the light, and are not, unless of a very dark shade, easily distinguishable in foggy weather from a white light.

Machines.—To produce these various characters the lenses are placed on a carriage which revolves on conical rollers, or is floated in a mercury trough, and is driven round by clock-work actuated by a falling weight. The tendency has been in recent years to drive the apparatus faster, so as to make the period of phase of the light as short as possible. While this is a desirable object it involves at the same time shortening the duration of the flash on the eye of the sailor, to which there is obviously a limit, if distinct vision is to be obtained under practical conditions. A flash of about half a second in length is regarded as what should be aimed at. The light at Sandy Hook, N. J., is an example of the modern flashlight.

Lanterns.—The apparatus is placed in a glazed lantern erected on the top of the lighthouse tower. With the view of intercepting as little light as possible, the framing or sashes are made of as small sectional dimensions as is consistent with strength, and are made either diagonal, with diamond-shaped flat panes, or helical with curved panes. The upper part of the lantern is made dome-shaped with a ventilator to carry off the fumes from the lamp. The size of the lantern varies with that of the apparatus, the usual size for a first-class light being 12 feet in diameter and 10 feet height of glazing.

Lightships.—In certain situations, such as on rocks where there is not sufficient room to get a large enough base for a tower, or on sandbanks where the sand is liable to shift, it is impossible, except at a prohibitive cost, to erect towers to carry the light. In such situations recourse is had to mooring in the vicinity a vessel which carries the light on a mast. The light is generally shown from a lantern formed round the mast, and the apparatus consists of parabolic reflectors or small dioptric apparatus. These light-vessels have a crew consisting of a master, mate, and nine men.

Beacons and Buoys are used in situations where powerful lights, such as can be shown from lighthouses and lightships, are not necessary, and where the extinction of the light would cause inconvenience and not disaster, but where some guidance is desirable, as, for example, in narrow sounds, rivers, and estuaries. Beacons are now frequently lighted with small dioptric apparatus, the illuminant being either compressed oil-gas stored in a receiver, in which case they need no attention for six weeks, or with oil-burners, in which case they must be trimmed every three days. Buoys are made of various shapes to denote on which side of them the safe channel lies. Thus, can-shaped buoys,

those with a flat top, are to be passed on the port hand, and conical shaped buoys on the starboard hand when the ship is going up an estuary or with the flood-tide, and vice versa. Spherical buoys denote a middle danger which may be passed on either hand. Buoys for particular places are further differentiated by color and top marks.

Fog-signals.—During the prevalence of fog and snowstorms the most powerful lights are obscured, and it becomes necessary to guide the mariner by sound signals. Hence a fog-signal has become a necessary adjunct of a fully-equipped lighthouse station. Various instruments, such as bells, gongs, guns, steam-whistles, explosive charges of tonite, reed trumpets, and sirens sounded by steam, electricity, or compressed air, are used. The most efficient and powerful fog-signal is the siren sounded by compressed air. In spite of the recent improvements in fog-signals they are undoubtedly the weak point in coast protection, as the exact direction from which a sound is coming is not easy to locate, and owing to the capricious and uncertain range at which sound can be heard.

Administration.—In Great Britain, the Trinity House of London, the Irish Lighthouse Board, and the Northern Lighthouse Board are the lighthouse authorities. The two last named were not constituted till 1786, but the Trinity House may be said to have originated in 1514. The French Commission des Phares was constituted in 1792, and remodeled in 1811; the United States Lighthouse Board was formed in 1789, and reconstructed in 1852. In Sweden, Norway, Holland, Denmark, Russia, and Austria the lighthouse administration is under the Admiralty or minister of Marine. In Spain, the system of administration is similar to that of France. For American administration see the article **LIGHTHOUSE BOARD OF THE UNITED STATES**.

Progress in America.—From one of the poorest-lighted coasts, the American Atlantic seaboard has, within a quarter of a century, become one of the best in the world, and the new system of lighthouses and signal lights is far more comprehensive than anything heretofore attempted. The Cape Hatteras region, and the scarcely less important Cape Cod district, early received special attention. Both of these capes were in the direct route of commerce, and the storms and shoals that made them dangerous to navigators had to be offset by adequate lights which would warn mariners of their proximity. The first attempts at lighthouse construction were consequently made at a few such dangerous points along the coast, and from these in either direction new lights were gradually erected. They formed the beginning of the new system which seeks to make all of our coast so well protected that navigators need have little apprehension in approaching the land from any direction at any point. But the rapidly increasing commerce on both the Atlantic and Pacific seaboard has made in recent years a more comprehensive system of lighthouses imperative. Likewise the shipping interests of the Great Lakes, the Gulf of Mexico, and the great inland rivers, have multiplied in importance, and the need for better protection from dangers to navigation has been general. For a quarter of

LIGHTHOUSE BOARD — LIGHTNING AND LIGHTNING-RODS

a century now the American lighthouse system has expanded and developed, until it has reached a point in its evolution where it is without question one of the best in the world.

The full extent of the lighthouse service can best be appreciated by simply stating that there are some 9,000 warning lights and signals stretched along the American coasts, forming a perfect link so that the navigator need never be beyond the sight of one of the beacons. Of this grand total — including lighthouses of different classes, buoys, beacons, and danger signals — over 3,000 are lighted, giving forth their signals at night time. One thousand of these lights are located on the Atlantic coast, 1,500 are scattered along the rivers and inland waterways, 500 on the Great Lakes, and 200 on the Pacific coast. The so-called lighted "aids" include a great variety of modern inventions, from the tall flashlight lighthouse, with its base of steel and stone, and costly lamp operated by electric power, to the modern gas and electric-lighted buoys, beacons and lightships. The advances made in lighthouse and buoy construction represent some of the marvels of modern engineering science.

In 1903, the most important light in the United States, the great tower at Barnegat, N. J., was completed with a light equipment equal to 30,000,000 candle-power. Steam and power are generated for local use, for the heart of the light is a 6,000 candle-power arc light. This is intensified by a great lens built up of rims of prismatic glass, with a bull's-eye in the centre 18 inches in diameter. This monster light can be seen at a distance of 100 miles; but, taking the curvature of the globe into consideration, sailors can make it out while still over 20 miles away. The Barnegat station is a most important one, being located on the most easterly point of the dangerous low-lying Jersey coast. See PLATE.

In the matter of lightships the United States leads the world. More than 40 of these are stationed at points along our coast where beacons are necessary, but where the building of lighthouses is impracticable. The Diamond Shoal lightship warns the navigator of his approach to dreaded Cape Hatteras. For years the lighthouse board tried to build a lighthouse on Diamond shoal, but at last, after more than \$250,000 had been spent and several lives lost, the attempt was given up.

The Fire Island lightship is one of the line of ocean lampposts which mark the entrance to New York harbor. It is equipped with a steam engine, electric lights, a steam whistle and many other improvements. The new South Shoal lightship, which is anchored 26 miles off Nantucket, is farther from shore than any other lightship in the world. It is the first American outpost and guards a shoal which in times past was a veritable graveyard for ships.

Steel Tubular Structures.—One of the most noted advances in modern times has been the abandonment of the old towers of stone or brick and the adoption of the steel tubular structures in their places. The latter are built more easily on a solid, rocky foundation than the old huge piles of masonry. The steel skeleton is bolted into the solid rock or anchored there by means of long spindle-like legs, which

sink many feet down into the firm foundation. These huge cylindrical towers of steel withstand the pressure of wind far better than the stone and brick structures, and their strength is so great that there is practically no danger of their ever being seriously injured by the elements. Even where the lighthouses are built in the water to mark shoals or dangerous reefs, the steel tubular style of structure is adopted. The foundation work of the structure is built up above the water with stone or concrete, and to this the steel tower is bolted. The latter looks more like a giant smokestack than anything else, and its stands as a permanent beacon of the sea to warn mariners of their danger. Not only is additional strength and security obtained through the adoption of the steel tubular lighthouses, but the cost of construction is greatly reduced. Modern lighthouses cost far more than they did in former days, but that is due to the fact that they are built on a larger and more enduring scale, and the lights are of far greater power and intensity. A modern American lighthouse frequently costs \$125,000, and often one third of this is spent in the electric light and apparatus alone. In the old system the lights represented a comparatively small proportion of the expense.

Bibliography.—Edwards, 'Our Seamounts' (1886); Elliott, 'European Lighthouse System' (1875); Heap, 'Ancient and Modern Lighthouses' (1889); Stevenson, 'Lighthouse Construction and Illumination' (1881); and United States Lighthouse Board's Annual Reports.

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Lighthouse Board of the United States. The, was organized in 1852 by Act of Congress, and has the management of all lighthouses, beacons, buoys, lights, etc. The board is composed of two naval officers, two engineers, and two civilians of scientific attainment. The Secretary of the Treasury is *ex-officio* president, while a chairman is annually elected from the Board. Standing committees are appointed on "experiments," "lighting," "engineering," "finance," and "floating aids to navigation."

Lightning and Lightning-rods. Franklin in 1751 proved that lightning is merely a vast electric spark; and until a generation ago, little was added to his exposition, to define the differentia of this special variety. The origin of atmospheric electricity is believed to be simple friction. Faraday showed that a powerful current could be excited by steam-driven spray against a water surface, and the friction of wind-driven mist on the earth's surface may produce a great difference of potential between the latter and the upper air, possibly though not probably assisted by the friction on dust particles in the air. In any event, rain conducts a portion of it to earth; so that a period of dry weather causes a great accumulation of electricity, the particles of air distributing their charges through each other. This would make the earth and sky, in Lodge's comparison, the two coatings of a Leyden jar, but ordinarily the distance is too great for a spark to pass. The effect of electrical discharges on vapor, however, is to condense it into larger globules; this causes it to sink toward the earth as cloud, and the enormous tension relieves itself by pass-

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ing to the earth or objects upon it, preferably projections of some height. If conduction through the cloud were instantaneous, it would be drained of its charge in one immense flash; but it being a poor conductor, several flashes at different points are requisite.

The discharge is determined by the tension of the air, the maximum of which without rupture is $\frac{1}{2}$ gramme per square centimetre. If the rupture is local, there is no flash, but only a brush; but it is often the case that when the weakest spot has given way, a general breach follows for a long distance, sometimes miles, creating the flashes which pass either from cloud to earth or from cloud to cloud; and as the discharge of this portion draws the remaining current toward it, a second flash or set of flashes is made probable. But this analysis shows what experiment proves, that this flash is not a single discharge, but the successive discharges of a countless number of vapor particles or raindrops toward the earth or other electrified particles in the air, with such rapidity of progress that they seem simultaneous; since it is most improbable that if vast numbers of points gave way at once, they should all give way in the same line. It has been further proved by Prof. Ogden N. Rood that even so, the flash is not a single sequence merely too swift for the eye to individualize; but although it lasts only a fraction of a second, it is itself composed of primary flashes in irregular sequence, each lasting but from a thousandth to a few thousandths of a second. This result was obtained by photography, which has invaluable supplemented laboratory experiment. By the latter, Prof. John Trowbridge has formed artificial flashes of lightning many feet long, made up of a combination of small discharges from a great number of petty cells. It had been long before proved by Joseph Henry that every electric discharge is an alternating or oscillating current, the periods of oscillation being only a few millionths of a second each and diminishing very rapidly in intensity; the entire duration depending on the magnitude and distance of the bodies. Hence it has been inferred that the small primary flashes are instances of these alternating discharges. Photography steadily tends to confirm these views.

Lightning according to its manifestations is divided into three classes. The "flash" or "stroke" lightning is the one had in mind when the name is used without qualification; it occurs either as a sharp zigzag line of extreme brilliancy, or the same forked, or in a wavy line oscillating with enormous rapidity, or in tree shapes with endless branches, or ribbon shape, or in a mass of strands of close but distinct parallel flashes like unraveled rope, or still other shapes. Dark flashes in photographs are only photo-chemical decompositions on the plate. The second sort is sheet lightning, a sudden glow of a golden or reddish tinge on the horizon, with no definite shape or bounds. It is not usually an actual discharge in that form, the very genesis of lightning making it rare; but is the reflection of lightning flashes out of sight beyond the horizon, cast on the clouds or atmospheric haze, and visible sometimes for many scores of miles beyond the place of the actual storm which causes the flashes. A third is ball lightning, which for a long time was not admitted as a genuine form of electric discharge, and is still a very difficult and in some points

unexplainable phenomenon. It has not been photographed, though something like it has been produced on a small scale in the laboratory. It is described as a ball or globe of brilliant light moving slowly a short distance above the surface of the earth or even rolling upon it, and has been said on occasion to float through an open door or window into a house, as though drawn in by a draft of air; it usually explodes, but without doing much damage. Under the head of lightning is sometimes included Saint Elmo's fire or corposant,—jets and brushes of light seen not only at the tips of masts and yards of a ship in a thunderstorm, but on mountain tops, in hissing tongues of brilliant white and blue light several inches long.

The rope-strand lightning is not solidly accounted for; though there is general agreement that the first flash makes a rent or tube in the air, along which succeeding discharges rush back and forward. Of the multiple flash, the explanation most conformable to laboratory experiment—where a spark between electrodes has been made to assume a like shape by blowing across it—is that the tube does not close for a fraction of a second, and the wind always violently present in a thunderstorm moves the mass of air sidewise simultaneously enough to keep the tube intact for a moment. Another theory holds that the tube closes up too quickly for this, but is so large that the alternate flashes appear side by side.

The thunder and the large raindrops accompanying lightning are well understood. The heat produced by the electric discharge traversing the atmosphere causes a sudden expansion of the particles next it, with a sharp compression of those beyond, in a great wave; on its passage the particles contract as suddenly, and the waves roll violently back, producing the noise of thunder. From the relatively slow passage of sound in the air, and the increased and uneven refraction due to differences of temperature and wind movement, the thunder-waves very soon begin to rise and pass inaudibly overhead; so that it is rarely heard more than fifteen or twenty miles off. The consolidation of the vapor into drops has been exactly imitated in the laboratory by electrifying spray, which causes the mist particles at once to begin aggregating in large globules. It has been shown that the mutual repellence of particles ceases as soon as a difference of potential is established by electrification, which substitutes a sort of suction around centres of force.

Protection from Lightning.—The annual destruction of life and property by lightning is very considerable: the former cannot be prevented to any great extent—though common-sense as to exposure can be instilled,—the latter could in part. In the United States during 1900, 713 persons were killed; parts of the Rockies and the upper Missouri Valley were the most dangerous. This rate, about five per million, is larger than in other countries, from our great population of outdoor agricultural and ranching laborers. Fatalities are everywhere increased by the tendency to seek shelter from the rain when caught out in a storm; and these isolated shelters, as trees, barns, monument buildings in public parks, etc., are among the most liable to be struck. In the same year, 1,842 domestic animals were killed; barbed-wire fences are held blamable to a large extent, from the animals'

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habit of huddling in fence corners during a storm. Statistics of buildings struck are in some respect significant, in others not detailed enough for utility. Thus, in Schleswig-Holstein during 1874-83, the annual average of strokes for wooden and thatched roofs was nearly $2\frac{1}{2}$ times greater than for slate or metal roofs, that for chimneys over 16 times as many even as the former, and that for windmills over one third larger still. On the other hand, we learn nothing from the fact that in the United States during 1900, out of 1,847 buildings struck, 40 had lightning-rods, 855 had not, and there is no report of 952, because not knowing what proportion of all buildings had them,—probably a very small one,—we have no percentages. On the other hand, it is notable that in nine years ending 1892, 2,335 barns, 104 churches, and 664 dwellings were struck, and the larger fire-insurance companies have generally ceased insuring farm buildings. Isolated buildings in general were in five times as great danger as those in city blocks, perhaps partly because protected by metal cornices, etc.

But is it worth while attempting to protect buildings in general from lightning? Aside from the fact that we are never sure a building struck may not involve a loss of life, the matter resolves itself into a question of cost, and it must be said plainly that it is not worth while. The problem is one for the insurance companies. In the eight years, 1885-92, in the United States, there were 3,516 fires from lightning, with a loss of \$12,663,835, or a little over \$1,500,000 a year. The insurable part of this was nearly all insured, and the practical question for property-holders is whether lightning-rods secure lower rates. Notoriously, they do not. The companies make not the least difference in rates for "protected" buildings, as to insurability or rates, and the officials rarely put them on their own dwellings; the lightning-rod business is virtually extinct in this country. The public would therefore gain nothing by the outlay; except that with uninsurable buildings, it would probably pay to enmesh them with metal points rather than undergo the risk. Of course also there are many cases where even a heavy expense ought to be incurred, as with buildings or their contents not replaceable with money,—historic or noted architectural structures, museums, etc. But the fact remains that to reduce this \$1,500,000 to one third that amount would cost fifty times the saving in gross and several times the amount in yearly interest.

If protection is desired, however, it is fully proved that a great quantity of scattered metal points—whether iron or copper is immaterial, and iron is cheaper—is the most effective; a mesh of barbed-wire fence over the roof and chimneys would be not only the cheapest, but one of the most effective protections. Perfect safety would be obtained by enclosing the building in a metal sheath, as no electric discharge can penetrate into an enclosed metal safe; next to this, a closely meshed wire cage; next a number of metal rods or wires all around. One rod is of little moment. Bulk of rod is of no avail, because the flash is so sudden that the interior or core of the rod has no chance to operate, all the discharge passing back and forth along the "skin"; but as the latter is liable to corrosion, the wire should not be too thin. The heavy copper rods of old time, however, are not

regarded as useful. Nor can any rods or wires ensure absolute protection. The old "conduit" theory of draining off the lightning, and having a good conductor to prevent resistance and insulators to prevent jumping, is now discarded: it is recognized that there is an enormous amount of electric energy to be discharged almost instantly, it is almost certain to distribute itself around a considerable area, and all that the points can do is to insure and regulate that distribution. There should always be a good "ground" or "earth" at the bottom, as a ton of coke or a water ditch. Consult Lodge's 'Lightning Conductors and Lightning Guards,' 1892.

Lightning Arrester, in telegraphy, a contrivance for guarding against passage of atmospheric electricity through the instruments. The line wires are attached to a plate of brass, usually serrated on the under side. This plate rests on another plate connected with the ground, the two being separated by a thin layer of insulating material.

Lightning-stroke. The effects of lightning-stroke on the body resemble those produced by large amounts of electricity at high voltage. Persons subjected to the influence of lightning-stroke may suffer very slightly or may be killed, and between these extremes a vast variety of minor or major injuries may result. The most characteristic form of injury is some sort of burn. This occasionally shows on the skin as an arborescence, which was formerly thought to resemble the tree under which a patient had sought shelter during a storm, but is, of course, solely an effect of the zig-zagging of the electrical discharge. In many persons mental shock and prolonged nervousness are frequent symptoms. Mild stunning, with a sense of suffocation, may be experienced when an electrical bolt strikes near a person, and occasionally nervous and hysterical attacks are induced. Suppression of menstruation and abortion have been reported. Numbness and prickling of various areas of the body; paralysis of the muscles; deafness; loss of smell and taste; and paralysis of the bladder and rectum have all been described. Occasionally insanities follow lightning-stroke. The experiences of persons who have been exposed vary greatly; but flashing in the eyes, buzzing in the ears, general tremor, which may go on to convulsions, with or without loss of consciousness, are not uncommon, and people who have been seen in this stage have been described as being blue, with muscles tightly contracted, the pupils dilated, the breath deep and snoring, and pulse feeble.

In death by lightning, changes in the nervous system have been found, and it is probable that the cause of death may be either the result of minute hemorrhages, which take place in the important centres of breathing and of the heart-action and in the medulla; or death may be the physiological effect of the electricity on the heart, causing a form of heart-tetanus, with rapid cessation of the movement of this organ.

The treatment of lightning-stroke, as well as of other forms of electrical injuries, should be promptly instituted. If commercial currents are used they should be removed at once, care being taken to use insulating materials to remove live wires. External heat to the body with hot-

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water bottle, cardiac stimulation with whiskey, ammonia, etc., with artificial respiration, should be simultaneously used.

No method of artificial respiration or other attempt to produce consciousness should be abandoned under three to six hours, as often no signs of life may be brought out in less than two to three hours. It is seriously advised by some observers that, before giving up all hope, an injection of an alkaline solution into the blood should be used. Hot saline solution may be thrown into the rectum, and the treatment should be continued until all possible methods of resuscitation have been employed. Consult Jelliffe, 'Death by Lightning and Electricity' (in 'Text-book of Legal Medicine and Toxicology,' 1903).

Lighton, William Rheem, American prose writer: b. Lycoming County, Pa., 13 July 1866. He was admitted to the Kansas and Nebraska bar in 1891 and has published 'Sons of Strength: a Romance of the Kansas Border Wars' (1899); 'Lewis and Clark,' in 'River-side Biography' Series.

Lig'nin, the substance of wood-fibre, formed in part at least by conversion from cellulose (q.v.), and contained within the cellular tissue, giving hardness and weight to the woody parts of plants. Its chemical composition is not determined, but it is characterized by being soluble in weak alkalis and insoluble in water.

Lig'nite, a partially carbonized fossil wood, retaining its woody fibre, and intermediate in its qualities between peat and coal. It is found in the secondary and tertiary strata, but chiefly in the latter. For description of lignite, and especially for composition of American lignites, see COAL.

Lig'num Vitæ, vi'tē. See GUAIACUM.

Ligny, lēn'yē, Belgium, village, 14 miles northwest of Namur, celebrated by the defeat of the Prussians under Blücher by the French under Napoleon, 16 June 1815, the same day on which Ney's command was engaged with the British under Wellington at Quatre-Bras. The Prussians lost 12,000 men and 21 cannon; the French, 7,000 men.

Liguori, lē-gwō'rē, Saint Alfonso Maria de, Catholic prelate, founder of the religious order called Redemptorists: b. Naples 26 Sept. 1696; d. Nocera, Italy, 1 Aug. 1787. He was originally a lawyer, but became a priest in 1722, joined the Congregation for the Propagation of the Faith, instituted in Naples, and occupied himself as a missionary in the instruction of the ignorant peasantry. In 1732 he founded a monastery at Villa Sella, the members of which were called the Order of the Most Holy Redeemer and were to be employed in the instruction of the people. This order, approved of by Pope Benedict XIV. in 1749, rapidly extended in Italy, Germany, Spain, and France. Liguori was in 1762 appointed bishop of Santa Agata de' Gotici by Clement XIII., from which office he resigned in 1775. He was canonized in 1839, and in 1871 was declared a doctor of the Church. His 'Theologia Moralis' has appeared in several recent editions (Ratisbon, 1881; Turin, 1892; Genoa, 1898), and there is a German edition of his letters (Ratisbon, 1893, et seq.).

Liguria, lī-gū'rī-a, in ancient Greek and Roman geography that portion of northern Italy extending along the Mediterranean from the frontiers of Gallia Cisalpina to those of Etruria, bounded on the north by the Po, east by the Macra, and west by the Varus. These were its limits at the time of Augustus, but at an earlier period it extended to the borders of Gaul, or even to the mouths of the Rhone. In 1797 Genoa received from Napoleon I. a democratic constitution, under the appellation of the Ligurian Republic. This republic ceased to exist in 1805, when the emperor incorporated it with France. After 1814 it formed part of the kingdom of Sardinia, and now of that of Italy, in which it comprises the provinces of Genoa and Porto Maurizio.

Ligu'rian Republic. See LIGURIA.

Lija, a fish. See FILE-FISHES.

Lilac, a genus of ornamental deciduous shrubs and trees (*Syringa*) of the order *Oleaceæ*. The species are characterized by opposite slender-stalked leaves, and purplish or white usually fragrant flowers in erect panicles. Nearly all the species, which have developed many horticultural varieties, are valued for park and garden planting, on account of their hardiness and free-blooming qualities. The common lilac (*S. vulgaris*) is a native of southwestern Asia, whence it was taken to Vienna during the closing years of the 16th century. It is probably the most widely planted of all the species. The wood of its larger specimens, which sometimes attain heights of more than 20 feet, is valued by cabinet makers, for turning and inlaying. About a dozen species are cultivated in America. They do best in deep, rich soil, but will succeed almost anywhere; indeed, they are likely to become a nuisance from their habit of suckering, a habit taken advantage of for propagating purposes. Cuttings are also used, and some of the newer and choicer varieties are grafted upon ordinary lilac or upon privet stocks. During the closing years of the last century the plant came into vogue as a florists' flower, large quantities being forced for the winter and early spring markets.

Lilburne, līl'bērn, John, English sectary and political agitator: b. Thickney Puncharden, County Durham, about 1614; d. Eltham, Kent, 29 Aug. 1657. For putting forth tracts hostile to the Anglican Church he was whipped and imprisoned in 1637, but was released by the Long Parliament in 1640, and the conviction having been declared illegal and tyrannic, he received \$15,000 indemnity. He then joined the army, and rose to the rank of lieutenant-colonel. He was one of the party known as the "Levelers" (q.v.), and for his attacks on Cromwell and others was several times committed to the Tower. Having been exiled and having returned without leave, he was put in prison and tried for his life, when he was acquitted but not liberated for some time. Subsequently he became a member of the Society of Friends. Hume describes him as "the most turbulent, but also the most upright and courageous of men."

Liliaceæ, līl-i-ā'sē-ē, or **Lily Family**, one of the most important orders of plants because of the uses made by man of many of its species, about 2,500 of which are comprised in nearly 200 genera. The characteristics of the group are

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monocotyledonous seeds; usually herbaceous stems which arise from bulbous, tuberous or rarely fibrous roots; generally narrow, simple leaves; and six-parted or toothed flowers solitary or arranged in various ways, such as panicles, racemes, etc. In habit, many are adapted to deserts, some to ponds and streams, others are climbers, etc. Among those useful for food may be mentioned asparagus, onion, garlic, leek, chive, rocambole, shallot, camass and various species of lilies. A very large number of species are used for ornament; for example, lily, hyacinth, tulip, fritillary, lily-of-the-valley, tuberose, Allium, and Yucca. Several species of Xanthorea and Dracena yield useful resins; some of the genus Chloragalum furnish a substitute for soap; and certain species of Yucca, Sanseveria, and of other genera, yield valuable fibres. Isolated species of various genera have been used in medicine.

Lil'ienthal, Max, American rabbi: b. Munich, Bavaria, 15 Nov. 1815; d. Cincinnati, Ohio, 5 April 1882. Graduating from the university of his birthplace, he was called to the directorship of a Hebrew school in Riga, Russia, and at government expense traveled through the 17 western provinces of Russia to encourage the Jews to make educational reforms. In 1842 this mission was ended, and until 1845 he remained in St. Petersburg, perfecting his educational system, when the Czar Nicholas issuing orders which aimed at the conversion of the Jews to the Greek Church, he emigrated to America. On his arrival in 1844 he was made rabbi of three synagogues, but in 1850 resigned to establish a school. In 1855 he accepted a call as rabbi of the B'nai Israel Congregation of Cincinnati, a position he held until his death. He was foremost in civil and educational reform, an active member of the board of education, and a director of the Cincinnati University. He was prominent in the councils of the Free Religion Associations, and always championed the cause of progressive Indians with his voice and pen. He aided largely in the establishing of the Hebrew Union College, and as an orator did much in his addresses in churches and on the public platform to promote social and religious reform.

Lil'is, or Lilith, a character in Jewish mythology. The Talmudists say that Adam had a wife before Eve, whose name was Lili. Refusing to submit to Adam, she left Paradise for a region of the air. She still haunts the night as a spectre, and is especially hostile to newborn infants. Some superstitious Jews still put in the chamber occupied by their wives four coins, with labels on which the names of Adam and Eve are inscribed, with the words "Avault thee, Lilith!" Our word "lullaby" is said to be a corruption of "Lilla, abi" (Lilith, avaunt).

Liliuokalani, lē-lē-wō-kā-lā'nē, Lydia Kamekeha, kā-mā-kā'hā, ex-queen of Hawaii: b. Honolulu 2 Sept. 1838. She was a sister of King Kalakaua, and succeeded him in 1891. She was married to John O. Dominis, an American (d. 1891), who became governor of Oahu. She attempted to substitute a less liberal constitution for that of 1887, and this course resulted in her being deposed 30 Jan. 1893. The islanders then adopted a provisional government, which soon became a republic. She endeavored

to secure assistance from the United States, visiting Washington in 1896 for that purpose, but on the annexation of Hawaii to the United States, in 1898, returned to the island. She revisited the United States in the winter of 1901-2 to press her claims for indemnity on the crown lands. See HAWAII.

Lille, lē'l, France, an important town, capital of the department of the Nord and chief fortress of the north, 127 miles north of Paris, and 7 miles from the frontier of Belgium. The former capital of French Flanders it was fortified as early as 1007. It is well built, and has spacious, regular streets, lined with large, massive houses. In the northwest of the town stands the citadel, a masterpiece of Vauban. New fortifications include a circle of detached forts. Among the churches are: St. Maurice, in the flamboyant style, recently restored; Notre Dame de la Treille, in 13th century Gothic; St. Catherine; the Madelaine; and the Protestant Church. Among secular buildings are the Hôtel de Ville, with rich collections of pictures, drawings, etc.; the exchange (1652); the prefecture; the palace of justice; the arsenal; the Paris Gate, a triumphal arch in honor of Louis XIV.; the general hospital; the theatre; and the concert-hall. Lille possesses a state university with four "faculties," a Roman Catholic university, lyceum, communal college, school of art, conservatory of music, public library of 100,000 volumes, botanic garden, zoological garden, etc. The industries include cotton spinning and weaving, fine linen thread, linen and cotton twist, broadcloth, beet-sugar (raw and refined), soap, oil, ribbons, tulles, tobacco-factories, engine-works, foundries, dye-works, bleach-fields, breweries and distilleries. Its situation on the frontier and extensive railway and water communication, make Lille a great entrepôt of trade. Pop. (1901) 215,431.

Lillibullero, lil'i-bū-lē'rō, a political ballad that "sung James II. out of three kingdoms." A scurrilous attack on the Irish recruits, it is said to have been written by Lord Wharton in 1686, and the setting is ascribed to Henry Purcell.

Lillie, Arthur, English author. He went to India and served in the Bengal infantry 1847-63. He has published: 'Out of the Meshes,' a novel (1869); 'Buddha and Early Buddhism' (1881); 'Buddhism in Christendom' (1887); 'The Influence of Buddhism on Primitive Christianity' (1893); 'Madam Blavatsky and her Theosophy' (1895); 'Buddha and Buddhism' (1900); etc.

Lillie, Lucy Cecil White, American writer of juvenile and other books: b. New York 1855. Among her many works are: 'Prudence,' a novel (1882); 'Rolf House' (1886); 'The Colonel's Money' (1888); 'The Squire's Daughter' (1891); 'Alison's Adventures' (1895); 'Honest Endeavor'; 'Kenyon's Wife.'

Lilliput, lil'i-püt, the name of a fabulous kingdom described by Jonathan Swift (q.v.) in 'Gulliver's Travels,' of which the inhabitants are not greater in size than a man's finger.

Lillo, lil'o, George, English dramatist: b. London 4 Feb. 1693; d. there 3 Sept. 1739. The son of a Dutch jeweler, he was brought up to his father's trade, and was for several years in partnership with him. 'Silvia, or the Coun-

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try Burial' (1730), a ballad opera, was his first piece; and was followed (1731) by the famous 'London Merchant, or the History of George Barnwell,' nowadays better known by its subtitle, which made its author famous, and held the stage for nearly a century. It had a marked influence in its day, and may be regarded as a precursor of the "domestic drama." His other dramatic productions include: 'Britannia, or the Royal Lovers' (1734); 'Fatal Curiosity' (1736); 'Arden of Feversham,' an adaptation of an Elizabethan play, revised or completed by John Hoadly after Lillo's death.

Lilly, lili', William, English astrologer: b. Diseworth, Leicestershire, 1 May 1602; d. Horsham, Surrey, 9 June, 1681. In 1632 he became interested in astrology, and two years later was associated with others in an unsuccessful search for treasure in the cloisters of Westminster Abbey. In 1644 he published the first volume of his almanac, 'Merlinus Anglicus Junior, the English Merlin Revived, or a Mathematical Prediction upon the Affairs of the English Commonwealth,' which appeared annually till his death. The king of Sweden sent him a gold chain and medal in 1659 in recognition of a favorable horoscope cast for him a short time before. He published many works, and was frequently engaged in controversy. His chief writings are: 'Christian Astrology, modestly treated in Three Books' (1647), reprinted in 1852 by Zadkiel as 'An Introduction to Astrology'; 'An Astrological Prediction of the Occurrences in England for the Years 1648, 1649, 1650' (1648); 'Monarchy and No Monarchy' (1651); 'True History of King James I. and King Charles I.' (1651); 'Annus Tenebrosus' (1652); 'Anima Astrologiae' (1676); and 'Catastrophe Mundi' (1683). Butler satirizes Lilly in Hudibras under the name of Sidrophel. His autobiography was published in 1715.

Lilly, William Samuel, English controversial writer: b. Fifehead, Dorsetshire, 10 July 1840. He was educated at Cambridge and has been secretary to the Catholic Union of Great Britain from 1874. He is a champion of the Roman Catholic point of view in such works as 'Ancient Religion and Modern Thought' (1884); and 'The Claims of Christianity' (1894). Other works of his are: 'A Century of Revolution' (1899); 'First Principles in Politics' (1899); 'Essays and Speeches' (1897); 'A Year of Life' (1900); 'Renaissance Types' (1901); 'India and Its Problems' (1902).

Lily. The type genus (*Lilium*) of the order *Liliaceæ* (q.v.). The several hundred well marked species which have been described are succulent herbs with scaly bulbs and usually leafy upright stems terminated by solitary or variously grouped six-segmented flowers of very diverse colors and markings. In general, lilies are among the most popular of garden flowers, having held this position for centuries. But in the United States they have not taken the high rank that they hold in Europe, especially in Great Britain. This is probably due largely to the dryer, hotter climate, and the injudicious planting of the bulbs where they cannot long survive.

The various species and their varieties are adapted to a wide range of soils, a few, such as *L. tigrinum*, *L. canadense*, and *L. superbum*,

often succeeding in heavy land if well drained, and some, such as *L. washingtonianum*, *L. philadelphicum* and *L. concolor* notwithstanding the peculiar conditions of slaty ridges if deeply planted and well mulched during the growing season. But the greater number thrive best upon fairly rich, well drained, deep sandy loam, especially if sheltered from prevailing winds and the hot sun of midsummer. Not that the stems cannot stand sunlight; but the bulbs and roots should be cool and well but not excessively supplied with moisture and food. The bulbs should always be planted deeply, six inches or more, and the soil stirred to double the depth of planting. This not only assists in keeping the roots cool but protects the bulbs from excessive freezing, which seems to have some effect upon the vitality of shallow planted specimens of even the hardiest species. Since vitality is also impaired by the exposure of the bulbs to the air, great care should be taken in transplanting to place the bulbs back in the soil as soon as possible after their removal. Transplanting is best done in early spring, the clumps being dug up, divided, the large bulbs planted in new, permanent quarters and the small ones and the bulb scales in nursery beds, where they should remain from one to three years, according to size when planted and to the species. One reason why bulbs obtained from seedsmen fail is because of undue drying. Orders for lilies should be given before the seedsman can obtain the bulbs, and they should be filled by him without delay after the bulbs arrive. Often bulbs become so flabby from loss of moisture that they may fail to grow until the second year. Hence it is advisable to plant all but plump and turgid bulbs in a nursery bed, or where they may remain undisturbed for a year or two before being placed in permanent quarters. Propagation by means of seeds is slow in most cases; and many species rarely produce seeds in the United States.

The Bermuda Easter lily (*L. longiflorum*, var. *eximium*) is the only kind that is forced upon a commercial scale in the United States, though several other kinds are to be found in the principal florists' stores and in private conservatories. For forcing, the bulbs of this variety are planted as soon after their arrival from Bermuda as possible, generally before the end of September, and are kept in a cool dark place until roots are well developed and the tops commence to form, when they are brought into the light, and by judicious management of heat, are hastened or retarded to ensure their blossoming at desired seasons, especially Easter Sunday. The management of other varieties used in greenhouses is more or less closely similar.

In general, lilies are most effective when mixed in small masses among shrubbery and hardy flower borders, the various kinds being sufficiently separated either in distance between the groups, or in season of blossoming, to avoid the clashing of inharmonious colors. Many of them have been used thus for ornamental planting, but though the great majority are well worth growing, scarcely a dozen have become widely popular in the United States, and of these not one is a native American species.

The following are probably the best known species: Tiger lily (*L. tigrinum*), a Japanese species, often exceeds three feet in height and bears a loose raceme of sometimes a dozen nod-

LILY-OF-THE-VALLEY—LIMA

ding dark-red, purplish-spotted flowers. It is a very hardy, useful species for the border, where it does best in masses. Madonna lily (*L. candidum*), a native of southern Europe, often attains three feet, bears from half a dozen to two dozen large pure white fragrant flowers in a raceme. It is a highly ornamental species, will do well upon sandy soils and in full sunlight. The Siberian coral lily (*L. tenuifolium*), which seldom exceeds two feet in height, bears from one to a score of scarlet, nodding flowers. Being very easy to propagate from seeds and bulb scales and of simplest culture, it is especially popular with beginners. Gold banded or Japan lily (*L. auratum*), which sometimes attains four feet, bears a few yellow-banded, purple-spotted, white flowers in a short raceme. It is less persistent than the tiger, and the showy lily, and somewhat less easy to cultivate, but is particularly useful for planting among groups of dark colored shrubbery. Showy lily (*L. speciosum*), a Japanese species, often exceeds three feet, bears six or more white or pinkish, red-dotted flowers in a raceme. It is a specially hardy, thrifty and satisfactory species, both for out-of-door planting and for greenhouse use. Next to the Bermuda Easter lily and *L. longiflorum* it is probably more widely grown by florists for cutting than any other kind. It has both white and red varieties. *L. longiflorum*, the original species of the Bermuda Easter lily, is forced in the same way as its variety. It is a native of Japan, from which country most of the bulbs are imported.

Besides the species mentioned the following are considered worthy of wide popularity: *L. chalcedonicum*, *elegans*, *testaceum*, *maximowiczii*, *martagon*, *maculatum*, *henryi*, *monodelphum* and *superbum*. These do well with little care upon ordinary light loamy soils. *L. canadense* and *superbum* succeed upon the same soils but require rather shady places. For cold climates even as far north as Ottawa, Canada, the following have proved successful: *L. brownii*, *wallacei*, *citrinum*, *croceum*, *melpomene*, *pardalinum*, *pomponium*, *dahuricum* and *batmanniae*. The odors of *L. croceum* and *pomponium* are very offensive even in the garden, and when they are planted they should be at some distance from the house. Among the most fragrant are *L. longiflorum*, *auratum*, *candidum* and varieties. Consult: Bailey, 'Cyclopedia of American Horticulture' 1900-2; Elwes, 'A Monograph of the Genus *Lilium*', 1880; 'Botanical Gazette,' Vol. XXVII., p. 235 (1899).

Lily-of-the-Valley, a low-growing perennial herb (*Convallaria majalis*) of the lily family, with creeping rootstocks from which ascend radical leaves and little white or pink fragrant flowers arranged in racemes upon scapes. The plant being a native of western Asia is one of those popularly supposed to be referred to in the Sermon of the Mount, the tulip being another. The plants are perfectly hardy. They thrive in partially shaded fairly rich loam, and may be readily propagated by means of the underground parts. Since beds are apt to run out they should be renewed every few years. The strong terminal buds known as pips are extensively used by florists for forcing the flowers throughout the year. Several horticultural varieties have been produced, some with variegated or striped foliage, others with pink, varie-

gated or double flowers. A highly esteemed perfume, *eau d'or*, is made in France from the flowers; and the rootstocks have been used by druggists, but are less popular than formerly.

Lilybæum, *lil-l-bē'üm*, the ancient name of Cape Boeo (q.v.).

Lima, *lī'mā*, Ohio, city, county-seat of Allen County; on the Ottawa River, and on the Erie, the Pennsylvania, the Cincinnati, H. & D., the Detroit Southern and the Lake Erie & W.R.R.'s; about 70 miles north of Dayton and the same distance south of Toledo. It is situated in an agricultural region and in the natural gas and petroleum belt of the State. The oil fields extend into six counties in the northwestern part of the State. The chief industrial establishments are locomotive and car works, machine-shops, petroleum refineries, and railroad shops. The shipping trade is chiefly in petroleum, farm and dairy products, and railroad car equipments. The city is the seat of Lima College, opened in 1893 under the auspices of the Lutherans. The city owns and operates the waterworks. Pop. (1890) 15,981; (1900) 21,723.

Lima, *lē'mā*, Peru, South America, a department in the western part, on the Pacific Ocean; area, 13,310 square miles. It is mountainous in the east, but along the coast the land is low, and in the river valleys productive. A number of villages and towns are in the valleys. One of the principal agricultural productions is sugar. There are rich mineral deposits, but as yet the mines are undeveloped. Pop. about 300,000.

Lima, Peru, South America, city, capital of the department of Lima; on the Rimac River, seven miles from the Pacific. Callao, on the Pacific, at the mouth of the Rimac, is the port of Lima; it is connected with Lima by two railroads, one on each side of the Rimac. Another railroad extends from Lima to Concepcion, a town on the eastern slope of the Andes. This railroad is in one place 15,000 feet above the sea. The city was founded by Francisco Pizarro 1535, and named *Ciudad de los Reyes*, "City of the Kings," because the site was chosen on 6 January, the feast of the "Wise Men," or the "Three Kings." Lima has considerable manufacturing industries and is developing rapidly. The adobe walls which surrounded the city were destroyed in 1870, and boulevards made in their place. The city has long been famed for its educational institutions; the national university, chartered in 1551, is the oldest university in America. It has courses in theology, law, medicine, applied science, political science, art, and music. The national library, founded in 1822, with some books from older libraries, was destroyed in 1880 by the Chileans. It contained then 60,000 volumes. It now contains about 50,000 volumes. There are several other libraries in the city. There are several technical schools, professional, classical, naval, and military, and about 100 elementary schools, besides a number of small private schools. Several scientific and literary societies provide public lecture courses. The city is noted for being the home of the first American canonized by the Roman Catholic Church, Saint Rose of Lima (1586). It has frequently suffered from earthquakes, the most destructive of which any record exists occurred in October 1746. At the time of the war between Peru and

LIMA E SILVA—LIME

Chile, the city capitulated without any resistance, and the Chileans kept possession for two years. Pop. about 116,000. Consult: Mortimer, 'Peru'; Middendorf, 'Peru.'

Lima e Silva, Luiz Alves de, 100'ës ál'ves dã 16'mã è sél'vã, duke of Caxias, Brazilian soldier and politician: b. Rio de Janeiro 25 Aug. 1803; d. Santa Monica, province of Rio de Janeiro, 7 May 1880. He rose to the rank of brigadier in the Brazilian army, was successively president of Maranhão, vice-president and military commandant of São Paulo, and president of Rio Grande do Sul; and in 1851-2 was commander of the Brazilian army, which, with Urquiza, defeated the dictator Rosas at Monte Caseros and drove him from Buenos Ayres. In 1855 he became minister of war; and from 3 Sept. 1856 to 3 May 1857 and again from 3 March 1861 to 4 May 1862 was prime-minister. He commanded the army of Brazil against Paraguay in 1866-9, and from 25 June 1875 to 5 Jan. 1878 was a third time premier.

Limburg, lim'boorg, or Limbourg, läin-boor, (1) a province in the northeast of Belgium, separated from the Netherlands province of Limburg by the Maas or Meuse; area, 931 square miles; pop. (1900) 240,796. It is flat throughout, and a considerable part of it, particularly toward the north, belongs to the Campine (see BELGIUM), and is desolate in the extreme. Hasselt is the capital, (2) a province in the Netherlands, partly bounded by Rhenish Prussia and Belgium; area, 850 square miles; pop. (1901) 292,072. It is partly flat, partly undulating, rich and fertile along the Maas, but in the north and west cold and sterile, large portions being covered with heath and marsh. Besides Maastricht, its chief towns are Roermond, Venlo, and Weert. There was formerly a county and duchy of Limburg. See BELGIUM; NETHERLANDS.

Lim'bus, a name given in Roman Catholic theology to the place where the patriarchs remained until the advent of Christ, who, before his resurrection, appeared to them, and opened the doors of heaven for them.

Lime, also known as caustic lime, quicklime or calcium oxide (CaO) is snow white in color and strongly alkaline, being one of the strongest bases. In contact with water for which it has great affinity it increases in bulk, evolves much heat and changes to the hydrate (CaH_2O_2). Unless kept in a dry place it will absorb moisture and carbonic acid gas from the air and change to the carbonate (CaCO_3) (see CALCIUM). Lime except for certain impurities is entirely soluble in water, the principal insoluble impurities being silica, alumina and iron oxide. It is never found native. For ordinary commercial uses lime is obtained by heating limestone, shells or other material composed of calcium carbonate to a temperature high enough to drive off the carbonic acid gas. As the materials used vary in purity, so is there a corresponding difference in the purity of the lime produced. Owing to its property of hardening, by change to calcium carbonate, and its comparative cheapness, lime is the most important of building materials. For commercial purposes the many varieties of lime are grouped into, (1) common or fat limes containing less than 10 per cent. of impurities, (2) poor or meagre limes containing 10 to 25 per

cent. of impurities, (3) hydraulic limes containing 15 to 40 per cent. of impurities and (4) hydraulic cements which may contain as high as 70 per cent. of impurities.

Common or fat limes in slaking evolve much heat and increase in bulk from two and a half to three times; except for some impurities they are entirely soluble in water. In hardening they shrink, and hence in making mortar require the addition of a large amount of sand. As fat limes are cheap and abundant and can take a large proportion of sand in making mortar, they are generally used for masonry. The poor or meagre limes are seldom used in this country. The hydraulic limes, so called from their property of hardening under water, though valuable for certain purposes, are also seldom used in the United States for masonry. They slake more slowly than ordinary limes with little rise of temperature and little increase in volume. Hydraulic cements (see CEMENT) do not slake and do not require the addition of sand to form mortar. They also set or harden much more quickly than ordinary limes, as the formation of calcium carbonate is a slow process that may under certain conditions take years, while in some quick-setting cements the formation of the calcium silicates and aluminates to which setting is due may take place in a few hours.

Limestone, marble and shells are burnt to lime by exposure to a temperature of 850 to 900° C. in a current of air. The harder the limestone the longer the time required for burning, but the better the product. Impurities in the limestone may or may not be injurious, depending on the quality of lime desired. Moisture in the limestone, or added to the charge, as by a steam jet, helps carry off the carbonic acid and hastens burning. Lime burning may be done in heaps or kilns. Heap burning in which pieces of limestone are piled on a grate of wood, then covered with fines or clay and fired, is now little used. Of kilns there are various types, intermittent and continuous firing. Of intermittent kilns the old "dug out" kilns built of ordinary brick on masonry into the side of a hill require about 72 hours for each firing. Heat is supplied by a coal or wood fire at the bottom. For continuous firing vertical kilns 20 to 25 feet high with draw openings, preferably below the fire line, are used, the lime being drawn every six hours. To supply moisture, water is kept in an iron pan in the ash-pit. In the kilns most commonly used there is no grate, but the fuel, preferably charcoal or anthracite, is charged with the limestone. The lime is not as pure as from furnaces with a bottom grate, but the consumption of fuel per pound of lime made is less. In such kilns burning is started by partly filling the kiln with limestone, putting in a thick layer of kindling wood and coal, starting the fire, and then adding alternate layers of coal and limestone. The type of continuous kiln in most favor is vertical, about 25 feet high, bottle-shaped and made of boiler iron lined with fire brick. Such a kiln may use petroleum for fuel, the oil being injected through openings in the wall just above the widest part of the furnace. Vertical kilns fired with gas have not proved successful. The type of kiln that requires the least fuel for amount of lime produced is the horizontal circular Hotman kiln, also used for making brick, drain tile, etc. The fuel is fine coal or even coal dust, and is put in through openings in the top. The lime pro-

LIME — LIMESTONE

duced is lighter than that from vertical kilns, stakes more easily and hence cannot be stored as well.

Most of the lime made is used for building purposes, but lime is also used for making glass and artificial stone, as an agent in many chemical processes, as whitewash, and was until recently largely used in sugar-making to separate sugar from molasses. No statistics of the amount of lime annually made in the United States have been compiled, but the value of the 1901 output was over \$8,400,000. See LIMESTONE.

S. SANFORD,

Assoc. Editor 'Eng. and Min. Journal.'

Lime, a shrub or small tree (*Citrus medica*, var. *acida*), a variety of the citron (q.v.) resembling the lemon in habit but rather more prickly and spreading; its fruits, also, are more nearly spherical, more acid and rather bitterer than commercial varieties of lemon. It is a native of southeastern Asia, whence it has spread to other warm countries where its juice is highly valued for making cooling drinks. In Florida and the West Indies, which supply the American market, large thickets of wild limes are to be found and these add to the crops from the cultivated groves. In California the lime is little cultivated because the cheapness of Mexican fruit prevents the realization of a profit from orchards. The lime is one of the most important sources of citric acid (q.v.). The trees are propagated, cultivated and trained much like lemon trees, but are planted closer together. They will stand poorer, stonier soil and nearer proximity to the ocean than other citrus fruits. The name is given in the Orient to various sour-fruited trees related to the true lime; in Europe and occasionally in the United States to the lindens (q.v.); and locally in the Southern States to the sour tupelo (q.v.), whose tart fruit is eaten.

Lime Light. See CALCIUM LIGHT.

Limerick, lim'ē-rīk, Ireland, a city and civic county, capital of Limerick county, at the interior extremity of the estuary of the Shannon, 106 miles by rail southwest of Dublin. It consists of three portions connected by five bridges, English Town on King's Island, and Irish Town and Newtown Pery on either side of the river. Limerick is of very ancient foundation, being mentioned by Ptolemy as Regia. The principal buildings are the Episcopal and Roman Catholic cathedrals, custom-house, chamber of commerce, town-hall, exchange, assembly-house and linen-hall. The manufactures include the curing of bacon, the preparation of butterine, and the making of army clothing. There are, besides, distilleries, breweries, tanneries, corn-mills, a patent slip for vessels of 500 tons, and a large graving-dock. Limerick is the leading port on the west coast for the shipment of raw produce. The

harbor, naturally a fine one, has been improved at a considerable outlay. Pop. (1901) 45,806.

Limestone, a common and widely distributed rock, consisting essentially of carbonate of lime and varying greatly in composition, color and texture. Most limestones are of organic origin and represent the calcareous remains of sea animals, such as corals, foraminifera and mollusks. These remains may be reduced to a fine ooze by the action of the waves and in other ways, and the rock resulting from the consolidation of this ooze may show no trace of organic origin. Some limestones have been formed by the precipitation of calcium carbonate from sea water through evaporation in confined estuaries. Other limestones (travertine, calcareous tufa) have been formed by the deposition of calcium carbonate from springs, while still others represent calcareous deposits in fresh-water lakes. The varieties of limestone are almost endless, including the crystalline limestones or marbles. Thus starting with nearly pure calcium carbonate, the calcium may be replaced gradually by magnesium till finally we have dolomite, the double carbonate of calcium and magnesium. Pure dolomite contains 21.72 per cent of magnesia, but limestones containing over 5 per cent are said to be dolomitic. Again the lime may be replaced by silica, with a gradual transition from limestone through cherty limestone to pure cherts; or again iron oxide may replace lime with a resulting transition from limestone to merchantable iron ore. Besides these chemical transitions siliceous or argillaceous sediments may be laid down with the calcareous material, and in the resulting rocks we may trace gradual changes from limestone through limy sandstones to pure sandstone and from limestone through marls or calcareous shales to ordinary shales. Bituminous matter may make limestone black or give rise to asphaltic varieties. Besides all these varieties of composition, limestones are often classified according to their texture, as earthy limestone, oölitic limestone with a concretionary texture, like the roe of fish, etc. Under rock stresses, with possible rise in temperature, limestones become crystalline and change to marbles. Chalk is a soft and powdery textured limestone. Limestones are also classified according to the uses to which they are put, and thus we have cement rock or hydraulic limestone used for making cement, lithographic limestone, statuary marble, etc.

The various limestones and marbles are widely used for building purposes, and a great amount of limestone is annually burnt to lime or to cement, though no statistics of the amount thus used are available (see CEMENT, LIME). Limestone is also used as a flux in smelting iron and other ores, the total amount thus used in the United States in 1902 amounting to fully 9,000,000 tons. Of the limestones used for build-

COMPOSITION OF
SOME LIMESTONES.

	Silica	Alumina	Iron Oxide	Lime	Magnesia	Calcium Carbonate	Magnesium Carbonate
Coral rock, Bermuda.....	....	....	....	53.82	1.01	96.11	2.13
Marble, Adams, Mass.....	0.63	....	0.55	55.60	0.23	99.30	0.49
Bedford limestone, Indiana.....	1.13	....	1.06	53.78	0.34	96.04	0.72
Lithographic stone, Bavaria.....	....	....	1.25	53.89	0.10	96.24	0.21
Hydraulic limestone, New York.....	15.37	....	11.38	25.70	12.44	45.91	26.14
Fresh water limestone, Wyoming.....	31.28	1.83	0.22	34.20	0.11	61.07	0.23
Marl, New Jersey.....	43.70	10.20	18.63	9.07	1.50	....	....

LIMICOLÆ—LIMPET

ing purposes particular mention may be made of the buff or blue oölitic Bedford limestone of Indiana and of the marbles of Vermont, Georgia and Tennessee. Marble or limestone is also used as a source of carbonic acid gas for aerated waters. The total value of the limestone and marble produced in the United States in 1901 was fully \$31,000,000. See CALC-TUFA; CALCITE; CHALK; CORAL; DOLOMITE; see also MARBLE.

S. SANFORD,

Assoc. Editor 'Eng. and Min. Journal.'

Limicolæ, li-mik'ō-lē, a group of birds, within the order *Charadriiformes*, containing the plovers, sandpipers, snipes, sheathbills, coursers, seed-snipes, stone-curlews, jacanas (q.v.) and their immediate allies, most of which are known to gunners as "shore birds" or "beach birds", because they haunt the shore of the sea or of inland bodies of water. They are mostly small, with slender bills of varying length, grooved for the nostrils, and in some families flexible at the tip, where nerves come close to the surface and enable the bird to feel about in the mud for its food. The legs are rather long, and the toes are ordinarily quite free, as these birds run about, and do not wade or swim as a rule; some, indeed, rarely approach the water, but dwell upon dry plains. The wings are strong and the powers of flight considerable; the most extensive migrations known are performed by some of the limicoline birds. All make their nests on the ground, and many breed only in the far north; the young run about as soon as freed from the shell. Light and pleasing, but not conspicuous colors prevail, but some species display great beauty. Nearly all are edible and are the objects of skilful sport by the aid of dogs, decoys and other devices to overcome their wit and wariness. Consult Evans, 'Birds' (Vol. I., Cambridge Natural History, 1900); Steineger, 'Birds' (Vol. IV., Standard Natural History, 1885); Elliot, 'North American Shore Birds' (1805); Baird, Brewer and Ridgway, 'North American Water Birds' (1884); Sclater & Hudson, 'Argentine Ornithology' (1888); and general works on ornithology and shooting.

Limited Liability, in modern statute law, a principle whereby the persons liable are bound under certain clearly defined conditions. The phrase is chiefly used in connection with stock companies, meaning that the stockholders shall not be called upon, under any circumstances, to contribute more than the par value of the shares of stock for which they have subscribed. If the debts of such a company, when wound up, amount to more than the resources of the company can meet, the creditors must bear the loss. In the United States shareholders in national and other banks, insurance companies, etc., are held to a specific and strict liability; in the case of the national banks, it is for twice the amount subscribed. In England the shareholders of a limited company from whose name the word "limited" is omitted must pay its debts in full. The United States Congress has adopted the rule followed by the British Parliament, and prevailing in European countries generally, with respect to the maritime law (q.v.) whereby a ship-owner, by surrender of the ship and the freight, may absolve himself from liability for negligence on the part of master or crew. Under the amended United States Revised Stat-

utes the principle of limited liability is clearly maintained and defined as applicable in this country; wherefrom it appears that "the owner of any vessel, whether steamer or canal-boat, employed whether in seagoing or inland navigation, whether he be an American citizen or a foreigner, may obtain a limitation to the value of his interest in the vessel and her pending freight, of his liability not only for the results of a single disaster, but for the results of a disastrous voyage, including all debts due on account of the vessel save seamen's wages".

Limne'a, the central genus of the pulmonate family *Limneidae*, containing the typical fresh-water snails. See POND-SNAILS.

Limoges, lē-mōzh, France, an episcopal city, capital of the department of Haute-Vienne, situated on a hill sloping to the Vienne, here crossed by three bridges, 88 miles west of Clermont. The fortified walls which surrounded the town have been replaced by fine shady boulevards. The principal edifices are the cathedral, commenced in 1273, presenting both Romanesque and Gothic features; the Gothic church of St. Michel des Lions; the church of St. Pierre du Queyroi; a modern town-hall, palace of justice, bishop's palace, public library, and several hospitals. The principal industry is the manufacture of porcelain; there are also wool and cotton spinning mills, cloth factories, foundries, paper-mills, and extensive shoe and clog making establishments. Limoges has a considerable trade in cereals, wine and spirits, wood, and cattle. It is the seat of courts of first resort and commerce; of a consulting chamber of commerce, lyceum, preparatory school of medicine, normal schools for male and female teachers, etc. Limoges was originally the capital of the Gallic tribe, the Lemovices, and an important city to the Roman "Augustoritum Lemovicum." Pop. (1901) 83,569.

Limon, lē-mōn', or **Puerto Limon**, poō-är-tō lē-mōn, Costa Rica, Central America, a port on the northeast coast, 72 miles (103 by rail) east of San José, the capital. A railway connects with Cartago, San José, Alaguila and Puenta Arenas. The port has been greatly improved by modern docks and iron piers, and a growing export trade is carried on especially in coffee, also in bananas, rubber, mahogany, dye-wood, etc. The town has ice factories, a brewery, a fine water supply, and a modern sewerage system. Pop. (1903) 4,000.

Li'monite (Greek λειμών, a meadow), an ore of iron (q.v.), varieties of which are bog iron-ore and yellow ochre. It is a hydrated oxide of iron ($2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$), of a brownish color, occurring in mammillated or botryoidal masses, which when broken across show a fibrous radiating structure, and also in compact and earthy masses. It is opaque, rather brittle, moderately hard, and has specific gravity 3.6 to 4. It dissolves in warm aqua regia; when heated it loses water and becomes magnetic. It is a very important ore of iron, and is found abundantly in the United States, especially in Virginia and Alabama, and in other parts of America; also on the continent of Europe, and in some parts of Great Britain. In 1901 the United States produced over 3,000,000 long tons of this ore.

Limp'pet, a gastropod mollusk, with a low conical, non-spiral shell; properly a representa-

LIMPKIN—LINCOLN

tive of the families *Patellidae* and *Acmaeidae*. The former has no *ctenidia* or true gills, but breathe by means of a ring of special branchial filaments between the mantle and the foot; in the latter the left *ctenidium* functions as a gill and there is no accessory ring. By means of a muscular, sucker-like foot, the limpets adhere so firmly to rocks near low-water mark that they defy the beating of the heaviest surf and are difficult to detach without injury. At high-tide they move about in search of the algae on which they feed, but are said to return to exactly the same place and position, the muscle in time wearing a smooth spot or "form" on the rock, and the shell becoming adapted to its irregularities. A widely distributed circum-polar species (*Acmaea testudinalis*) is common on the New England coast, and may be recognized by its low, conical, smooth shell with the eccentric apex slightly turned forward. In Europe limpets are utilized as food and in this country for bait. The key-hole limpets belong to the family *Fissurellidae*, in which the shell is usually perforated like a key-hole at the apex to permit the protrusion of a process of the mantle. Numerous species occur in the littoral zone of warm seas. The *Haliotidae*, ear-limpets or abalones (q.v.) are closely related. The cup-and-saucer limpets and slipper-limpets (*Calyptotræide*) have flat shells usually provided with an internal lip or shelf. Several species of *Crepidula*, having interesting commensalistic habits, are abundant on our coasts, and are known to fishermen as "half-decks." Finally the fresh-water limpets (*Ancylus* and *Gundlachia*) belong to the pulmonate family *Limnaeidae*. Numerous species of these true air-breathing limpets are found abundantly on stones and plants in the fresh-water streams and ponds of the United States. They feed on *confervæ*. Limpets, especially *Acmaea* and *Patella*, are of very ancient race, having existed almost unchanged since the Silurian Age.

Limp'kin, a crane-like bird of the swamps of tropical America, known and superstitiously half-feared by the more ignorant natives of Central America and the West Indies, on account of its sombre plumage and wailing cry. Two species exist, *Aramus scolopaceus* and *A. pictus*.

Limpopo, lim-pō'pō, or **Crocodile River**, South Africa, a river which rises to the south of Pretoria in the Witwatersrand, flows northwest through the Transvaal, then northeast, forming for a considerable distance the northern boundary of the Transvaal, then southeast into the Indian Ocean north of Delagoa Bay; length about 1,100 miles. Its largest tributary is the Olifants, which flows through the eastern part of the Transvaal and joins it in Portuguese territory.

Lim'ulus. See **HORSE-FOOT CRAB**.

Linares, José María, hö-sā' mä-rē'ä lē-nä'-rēs, Bolivian statesman: b. Potosí 10 July 1810; d. Valparaiso, Chile, 1861. He was admitted to the bar, was appointed one of the commissioners to prepare a legal code for Bolivia, in 1839 became minister of the interior, later minister to Spain, and in 1848 president of the senate. In 1857 he was chosen president. His administration was admirably progressive, but his policy was opposed, and he was deposed by revolutionists in January 1861.

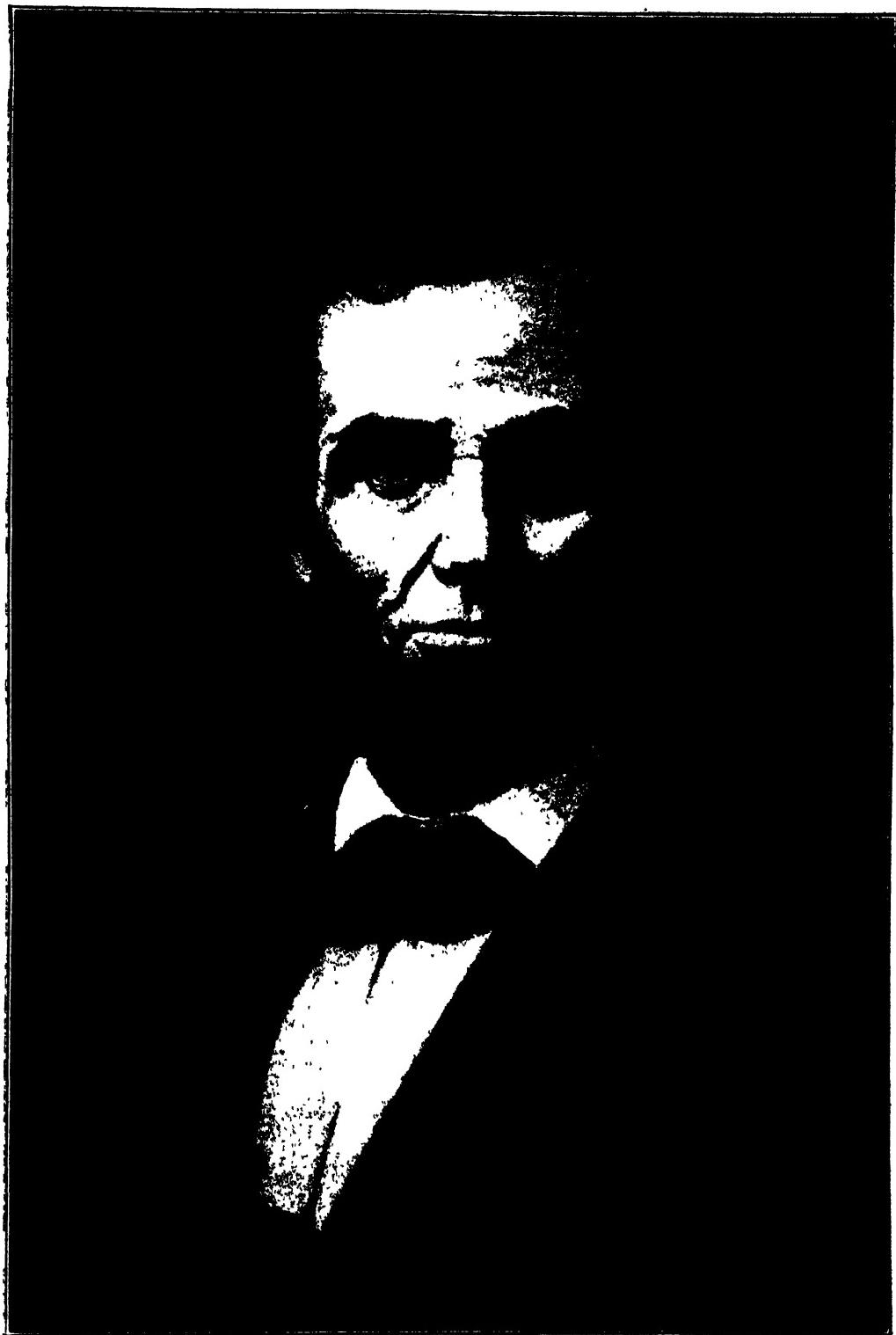
Linares, Chile, (1) a southern province bounded north, south, and west by the provinces of Talca, Nuble, and Maule, and on the east by the Andes; area, 3,589 square miles; pop. (1895) 101,858; (2) a town, the capital of the above province, 10 miles southeast of Talca. Pop. (1895) 7,331.

Lincoln, Abraham, 16th President of the United States: b. Hardin County, Ky., 12 Feb. 1809; d. Washington, D. C., 15 April 1865. His ancestors were English Quakers, who settled in America in the 17th century. His grandfather, Abraham Lincoln, a man of property, removed from Virginia to Kentucky about 1780 with three sons. Thomas, the youngest son, learned the carpenter's trade, and married (12 June 1806) Nancy Hanks, a handsome young woman of lowly condition but possessing qualities of intellect and character above the average. From this union came three children: the oldest a daughter; the second, named Abraham; the third, a son who died in infancy. Abraham's parents were plain people, and the log-cabin they lived in was a true home. The father could not read or write (except to scrawl his signature); he was always poor, and is described as shiftless. The mother could read but not write. A woman of piety and excellent judgment, she left an indelible impress on her son. From her he inherited the serious temperament, brightened by the spirit of playfulness that was so prominent a trait of the man throughout his troubled career. She died in 1818, and the boy of 9 deeply mourned her loss. In later years he said: "All that I am, and all that I hope to be, I owe to my angel mother."

In 1816 Thomas Lincoln sold his Kentucky farm and found a new home in a sparsely-settled district of Spencer County, Indiana. In his boyhood Abraham learned the use of firearms, and helped his father cut down trees. He got, all told, a year's schooling. His teachers were men who never went "beyond readin', writin', and cipherin' to the rule of three." The boy eagerly devoured the few books that fell into his hands: the Bible, *Aesop's Fables*, '*Pilgrim's Progress*', '*Robinson Crusoe*', and the lives of Washington and Henry Clay. After he grew up he kept on reading and studying, and gained what must be considered a fair education, including Euclid and the rudiments of surveying. In childhood he had a passion for re-stating, in clear language, the confused and not over-intelligible ideas of others. In this way he acquired his unusual power of "putting things." When a youth he practised speaking in public on temperance and political subjects.

At the age of 20, Abe Lincoln, as he was called, had grown to extraordinary stature, nearly 6 feet 4 inches, and his great muscular strength was the talk of the neighborhood. He had developed his native vein of humor, which afterward made him famous. From the life of a woodman he turned to flatboating, making a voyage down the Mississippi to New Orleans and back with one companion.

In 1830 Thomas Lincoln, who had married an estimable widow, Sarah Bush Johnston, moved to Sangamon County, Illinois. From this home he departed in a short time to Coles County, where he died in 1851. Meanwhile his son had found employment as a farm hand and



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railsplitter. With his rifle he supplied the family with game in the hard winter of 1830-1. In the spring of 1831 he made another flatboat trip down the Mississippi. After his return he clerked in a grocery at New Salem, and became known among his acquaintances as "Honest Abe." In 1832 he served in the Black Hawk war, part of the time as captain of a volunteer company, but saw no fighting. Later he became a storekeeper, postmaster, and at intervals worked at surveying. He was a Whig member of the Illinois legislature eight years (1834-42), and as a legislator he made a creditable record, and through his influence the State capital was removed from Vandalia to Springfield in 1839.

Having studied law, Lincoln was admitted to the bar in 1836, and the next year began his law practice in Springfield, as partner of John T. Stuart. Among his associates in the Illinois capital were men who afterward achieved eminence in law and politics. It is enough to say that Lincoln held his own in legal combats with the best of them. In these years he met the man destined to be his political rival, Stephen A. Douglas. In 1841 he formed a new partnership with Stephen T. Logan, and from 1843 to his death was senior partner with William H. Herndon, whom he generally called Billy.

While Lincoln earned and deserved the reputation of being an able lawyer, he was never a learned jurist. His leisure was spent in general reading, history, and political economy. English grammar he had mastered by himself, and he acquired skill in composition by writing out an epitome of each book he read. Thus the young lawyer laboriously schooled himself in thinking and in the art of expressing himself clearly and correctly. In the court-room it was characteristic of him to waste no time on unessentials, but to spend his strength on the one point that was really the heart of the case. Sometimes his pleas were surprisingly short. A good illustration of his terse manner of speaking is his address to the jury in the suit against a man known as "King" Hart for seizing a piece of land from the plaintiff, Lincoln's client. The trial was held at Metamora, Woodford County. During the trial he had little to say and the case was seemingly lost, but he gained a prompt verdict by this brief speech: "We don't believe in kings in this country. We refuted that doctrine almost 100 years ago, but we have a doctrine in this country that we do believe in. It is the Monroe Doctrine. When the kings of Europe attempt to seize land in this hemisphere we apply the Monroe Doctrine to them and they experience a change of heart. Why should we not apply the same doctrine to American kings? This little king is attempting to secure possession of land to which he has no claim, and you, gentlemen of the jury, stand in the same position as the government of the United States; you must protect a weak vassal by applying the Monroe Doctrine to this American king."

Lincoln's law practice grew and he prospered, although many of his clients were poor and fees were sometimes nothing. Success had come, but the death of his sweetheart clouded his life and deepened his melancholy. He married (4 Nov. 1842) Mary Todd, a woman belonging to an influential family of Lexington, Ky. Though a devoted wife, she was not his

heart's choice. They had four sons, of whom only the eldest, Robert Todd, is living.

There is truth in the statement that Lincoln was too much of a politician to be a great lawyer. He took more than a passing interest in politics and he was quick to improve opportunities for political advancement. In the election of 1844 he "stumped" the State as the champion of the Whig party, making many speeches on the tariff question, which he had thoroughly studied. He spoke familiarly, mingling argument with anecdote and attempting no flights of oratory. His homely illustrations and striking utterances left a deep impression on his audiences. To enter Congress had long been his ambition, and in 1846 he was elected as representative from the central district of Illinois. He was the only Whig from his State, his six colleagues being Democrats. During his term (1847-9) he held with his party in favoring a protective tariff and in making appropriations for public improvements. Although opposed on principle to the Mexican War, he invariably voted for granting supplies needed by soldiers in the field. In 1858 he said (in debate with Douglas): "Whenever the Democratic party tried to get me to vote that the war had been righteously begun by the President, I would not do it." Already he had pronounced views on the question of slavery. When a member introduced a bill to abolish the slave-trade in the District of Columbia, Lincoln proposed an amendment for the abolition of slavery in the District. He always supported the Wilmot Proviso, voting for it about forty times. He was not a candidate for re-election, but applied for the office of commissioner of lands. This position he failed to get. Instead he was offered the governorship of Oregon, which he declined.

Returning to Springfield, Lincoln resumed the practice of law. Meanwhile he closely watched the signs of the times, foreseeing trouble with the slaveholders because of their manifest intention to encroach upon the soil of the Western Territories. He was deeply stirred by the repeal of the Missouri Compromise in 1854 and entered actively into the canvass of that year. In this memorable campaign he was pitted against Stephen A. Douglas, the "Little Giant." The first debate between the two men was at the State Fair (in October), before a vast multitude. Lincoln's speech on this occasion was regarded the ablest effort of this campaign. Its keynote is in the following passage: "My distinguished friend says it is an insult to the emigrants to Kansas and Nebraska to suppose they are not able to govern themselves. We must not slur over an argument of this kind because it happens to tickle the ear. It must be met and answered. I admit that the emigrant to Kansas and Nebraska is competent to govern himself, but I deny his right to govern any other person without that person's consent." The second meeting of the two champions was in Peoria, and after Lincoln had finished, Douglas (as a hearer remarked) "hadn't much to say." Thereafter the "Little Giant" kept out of the way of his antagonist. Through Lincoln's influence Lyman Trumbull, the candidate of the anti-Nebraska (afterward Republican) party, was elected United States Senator. The same year Lincoln declined the nomination for governor.

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In the first Republican National Convention, held at Philadelphia in 1856, Lincoln received 110 votes for the vice-presidency on the ticket with John C. Fremont. When the choice of the convention fell upon Fremont and Dayton as the standard-bearers of the new party, Lincoln entered earnestly into the campaign. His name headed the electoral ticket of Illinois. In those years Lincoln had a great reputation as a campaign speaker, and was a tower of strength to his party. The common people recognized him as a diamond in the rough and he was admired and trusted even by his enemies. His speeches were masterly and held his audiences spell-bound. No other orator of the period could equal him in the rare combination of wit, argument, and dramatic power. A contemporary who saw and heard him gave this word-portrait of the man: "At rest, his features, though those of a man of mark, are not such as belong to a handsome man. . . . His head sits well on his shoulders, but beyond that it defies description. . . . It is very large and, phrenologically, well proportioned, betokening power in all its developments. A slightly Roman nose, a wide-cut mouth, and a dark complexion, with the appearance of having been weather-beaten, complete the description."

The Lincoln-Douglas joint debate of 1858 has become historic. It was more than a contest between two rival candidates for a seat in the United States Senate. The discussion was one in which the whole nation was deeply concerned. It was a critical moment in the long-drawn struggle between North and South over slavery, and public feeling ran high. Lincoln was the strongest man in the Republican party, and Douglas was the recognized leader of the Democratic party. Lincoln threw down the gauntlet in a letter asking Douglas to divide time with him and address the same audiences in the coming canvass. Douglas was reluctant to accept the challenge, but consented to make appointments to debate with Lincoln in the several congressional districts of Illinois. "I agree to your suggestion," he wrote (30 July 1858), "that we shall alternately open and close the discussion. I will speak at Ottawa one hour, you can reply, occupying an hour and a half, and I will then follow for half an hour. At Freeport, you shall open the discussion and speak one hour; I will follow for an hour and a half, and you can then reply for half an hour. We will alternate in like manner in each successive place." By this arrangement Douglas had four opening and closing speeches to Lincoln's three, a distinct advantage. They appeared together before tremendous assemblages of people, at Ottawa (21 Aug.), Freeport (27 Aug.), Jonesboro (15 Sept.), Charleston (18 Sept.), Galesburg (7 Oct.), Quincy (13 Oct.), and Alton (15 Oct.). Throughout this celebrated word-duel Lincoln kept his temper and treated his opponent with courtesy and fairness, indulging in no offensive personalities. Douglas was acknowledged to be the ablest debater in Congress, and he never spoke with greater eloquence. He took with the crowd and won much applause, while Lincoln left the deeper impression. He set his hearers to thinking on and discussing the absorbing question of the day. The great difference between him and Douglas was that he took higher moral ground, in holding slavery to be a wrong. He appealed to

reason and conscience. The immediate result of these debates was Douglas' election as senator. The far-sighted Lincoln looked ahead to the contest for the presidency, assured that Douglas could not win in 1860.

From this time Lincoln's reputation was national, and he received invitations to speak in other States. In May 1859, the Republican party of Illinois declared Lincoln to be its choice for the presidential nomination in 1860. In September he addressed audiences in Columbus and Cincinnati. In December he spoke at several prominent points in Kansas, making a profound impression. On 27 Feb. 1860 he visited New York and delivered his famous Cooper Union oration, followed by speeches in New England. All his utterances had a bearing on the matter of the extension of slavery. He stood forth as the defender of the right of freedom. The development of events made him the nominee of the party of freedom, when the Republican National Convention met in Chicago (16 May 1860). Hannibal Hamlin, of Maine, was nominated for vice-president. The Democrats were divided, the candidate of the Northern wing of the party being S. A. Douglas, while the pro-slavery section nominated J. C. Breckinridge. Another candidate, John Bell, was put forward by old-time Whigs and others. A combination of circumstances gave Lincoln the victory at the polls. The electoral vote stood 180 for Lincoln, 72 for Breckinridge, 39 for Bell, and 12 for Douglas.

During the four remaining months of Buchanan's administration the storm of secession gathered in the South, and the movement was promoted by the treachery of John B. Floyd, then secretary of war. A number of United States arsenals and forts in the South, with many stands of arms, were seized by State troops. The Confederate Congress, representing South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida, met (4 Feb. 1861) at Montgomery, Ala., and chose Jefferson Davis president and Alexander H. Stephens vice-president of the seceded States. On 18 Feb. Davis was inaugurated president. Lincoln watched the course of events in silence until the eve of his departure (11 Feb.) for Washington, when he took leave of his friends and neighbors in an address that was in parts deeply religious. "I go to assume," he said, "a task more difficult than that which has devolved upon any other man since the days of Washington. He never would have succeeded except for the aid of divine Providence, upon which he at all times relied. I feel that I cannot succeed without the same divine blessing which sustained him; and on the same Almighty Being I place reliance for support." After visiting Cleveland, Buffalo, New York, and other cities, he passed through Baltimore in disguise, because of a plot to take his life. He reached Washington (23 February) and was inaugurated 4 March. Although an untried man, unknown to the majority of the people outside of his own State, the new President made a favorable impression and inspired confidence in his ability to cope with a serious situation. According to his position, repeatedly stated, the nation could not permanently remain half slave and half free; he expected that sooner or later slavery as an institution would disappear. How and when, he left to be settled by the logic of events. He argued that "no



STATUE OF ABRAHAM LINCOLN, BY SAINT-GAUDENS.

IN LINCOLN PARK, CHICAGO.

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State upon its own motion can lawfully get out of the Union." The members of his cabinet were: W. H. Seward, secretary of state; S. P. Chase, secretary of the treasury; Simon Cameron, secretary of war; Gideon Welles, secretary of the navy; G. B. Smith, secretary of the interior; Edward Bates, attorney-general; Montgomery Blair, postmaster-general. In January 1862 Edwin M. Stanton succeeded Cameron, and there were other changes in the cabinet later. Seward, Welles, and Stanton were continued in office in his second administration.

The story of Lincoln's life the next four years is involved in the history of the Civil War. Although the South was busy preparing for war, the people of the North were slow to act, hoping in vain for peace. The lull before the storm lasted several weeks until the firing on Fort Sumter (12 April 1861). War had been begun by the slaveholders of the seceding States, and President Lincoln issued a call (15 April) for 75,000 troops. On 19 April he proclaimed the blockade of all ports of the Confederate States. Volunteers for three years were asked for, and recruits for the regular army and navy. Meanwhile Texas, Virginia, Arkansas, North Carolina, and Tennessee had seceded. Congress met in extra session (4 July). In a memorable message Lincoln referred to the attack on Fort Sumter, saying that "no choice was left but to call out the war-power of the government, and so to resist the force employed for its destruction by force for its preservation." Congress passed measures for the energetic prosecution of the war, and the North was encouraged by several successes in the latter part of the year.

It was, however, a war to save the Union, not to destroy slavery. That was Lincoln's object in 1861. Fugitive slaves coming into the camp of General B. F. Butler were set to work for the Federal government, and a record was kept of them with the view of compensating loyal owners. The Confiscation Act (passed 6 August) affected only the slaves of rebel masters who "required or permitted" them to aid the rebellion. The President disapproved and countermanded General Fremont's remarkable order, freeing the slaves of active rebels. Time proved the wisdom of his policy of going slow in the matter of the emancipation of the slaves. In the Trent affair popular feeling was at first against Lincoln for surrendering Mason and Slidell, the Confederate envoys to Great Britain and France, but his common-sense course, though humiliating to national pride, was approved by the sober second thought of the people.

General Winfield Scott retired (1 Nov. 1861) and was succeeded as commander-in-chief by General George B. McClellan, who had organized and drilled an effective army but was slow to make an advance against the enemy. President and people grew impatient at his long delay and (11 March 1862) he was relieved from chief command, though retaining command of the Department of the Potomac. In the meantime General U. S. Grant, in co-operation with Commodore Foote, captured Forts Henry and Donelson, and the little Monitor had worsted the Merrimac. In the spring and summer the Federal armies were successful at Shiloh, New Orleans, Malvern Hill, and Antietam. The sec-

ond battle of Bull Run and the battle of Fredericksburg were lost. On the whole, progress had been made, notwithstanding many blunders on the part of Northern generals. The President, not being a military expert, had also made mistakes of judgment in directing the movements of troops. The end of the struggle seemed far off.

On 1 Jan. 1863 the Emancipation Proclamation, freeing the slaves, went into effect. Congress had previously passed a bill abolishing slavery in the District of Columbia, and slavery had been prohibited in the Territories. Volunteers of African descent were enlisted, and on 22 Sept. 1862 the President's preliminary proclamation announced that in territory still in rebellion (1 Jan. 1863) slaves would be declared forever free. The act of emancipation was a military necessity. In his message to Congress (1 Dec. 1862) Lincoln recommended that loyal owners be compensated. Before the Thirty-seventh Congress adjourned (4 March 1863) it empowered the President to suspend the writ of *habeas corpus* and authorized the loan of \$300,000,000 for carrying on the War in 1863. The number of Union soldiers on duty was about 700,000, and a call for 300,000 more was issued (17 October). From time to time more treasure and men were forthcoming, as the country gradually realized the magnitude of the conflict. The campaigns of 1863 resulted in great gains to the North, the most notable victories being at Gettysburg (1-3 July), Vicksburg (4 July), and Chattanooga (25 November). The battle of Gettysburg has been called the turning-point of the war. A portion of this field was set apart (19 November) for a national cemetery, and at the dedication Lincoln delivered an address so compact and felicitous in thought and statement that it has become a classic. His thanksgiving proclamation of this year was marked by lofty sentiment and rare beauty of language.

Henceforth the South waged a losing fight. Grant took chief command (10 March 1864) as lieutenant-general and won the hard-fought battles of the Wilderness (5-6 May), Spottsylvania (10 May), and Cold Harbor (3 June). Sherman took Atlanta (2 September), and Savannah (21 December). Decisive blows were struck by Farragut, Sheridan, Thomas, and other Federal commanders. At the National Republican Convention, which met at Chicago in June 1864, Lincoln was renominated on the first ballot; Andrew Johnson, of Tennessee, was nominated vice-president. The overwhelming majority for Lincoln on election day showed conclusively that the people were with him. His second inaugural (4 March 1865) justly ranks as the greatest of his public utterances. The war was all but ended, there being one more battle, Five Forks (1 April), before Lee's surrender at Appomattox (9 April). The rejoicing of the nation was suddenly turned to mourning when the President was shot in Ford's Theatre, Washington, on the evening of 14 April, by John Wilkes Booth. He lingered unconscious and died the next morning. His remains, after lying in state in the Capitol, were borne to Springfield and there buried (4 May). His tragic end as well as his public services had gained him a place in the hearts of his countrymen not second to that of Washington, and in the estimation of

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many he was and is regarded as the greatest of Americans.

Consult: Lincoln's complete works, edited by Nicolay and Hay (2 vols. 1894); lives by O. J. Victor (1864), L. P. Brockett (1865), H. J. Raymond (1865), J. G. Holland (1866), W. O. Stoddard (1884), I. N. Arnold (1885), Nicolay and Hay (1890), Carl Schurz (1891), J. T. Morse (1893), N. Brooks (1894), N. Haggard (1899), I. M. Tarbell (1900), W. E. Curtis (1903); also reminiscences by A. T. Rice (1886), F. F. Browne (1886), H. C. Whitney (1892), W. H. Herndon (1892), and W. H. Lamon (1895).

EUGENE PARSONS,
Author and Editor.

Lincoln, Benjamin, American general: b. Hingham, Mass., 24 Jan. 1733; d. there 9 May 1810. Until the age of 40 he followed the calling of a farmer, holding also at different times the offices of magistrate, representative in the provincial legislature, and colonel of militia. He was also an active member of the three provincial congresses of Massachusetts, and as militia officer displayed an efficiency which procured his promotion in 1776 to the rank of major-general. In this capacity he became favorably known to Washington during the siege of Boston. In the beginning of 1777 he joined Washington at Morristown with a new levy of militia, and soon after, at the suggestion of the commander-in-chief, was transferred to the continental service with the rank of major-general. He was sent to join the forces assembled to oppose the progress of Burgoyne and during the battle of Bemis' Heights commanded inside the American works; and was severely wounded in the leg, and compelled for nearly a year to retire from service. In September 1778 he was appointed to the command of the southern army, and upon the arrival of Count d'Estaing cooperated with the French troops and fleet in the unsuccessful assault on Savannah. From the unwillingness of his allies to continue the siege he was obliged to return to Charleston, where in the spring of 1780 he was besieged by a superior British force under Sir Henry Clinton. After an obstinate defense he was forced in May to capitulate, and retired to Massachusetts on parole. In the spring of the succeeding year he was exchanged, and subsequently participated with credit in the siege of Yorktown. In consideration of his merits and misfortunes Washington appointed him to receive the sword of Cornwallis upon the surrender of the British forces. He held the office of secretary of war 1781-3, and in 1787 commanded the forces which quelled the Shays' Rebellion in western Massachusetts, and in the same year was elected lieutenant-governor of the State, which office he held one year. He was collector of Boston 1789 till about two years before his death. He was a member of the commission which in 1789 formed a treaty with the Creek Indians, and of that which in 1793 unsuccessfully attempted to enter into negotiations with the Indians north of the Ohio. See life by Bowen in Sparks' 'American Biography' (2d series, Vol. XIII., 1847).

Lincoln, Charles Perez, American lawyer: b. Quincy, Mich., 7 Oct. 1843. He was educated at Hillsdale College; entered the Union army at the beginning of the Civil War, and served until mustered out of the service in June 1864. He was

admitted to the bar in 1871; was consul at Canton, China, 1875-81, and then began to practise his profession in Washington. He was elected commander of the Department of the Potomac, G. A. R., in 1888; and was 2d deputy commissioner of pensions 1889-93.

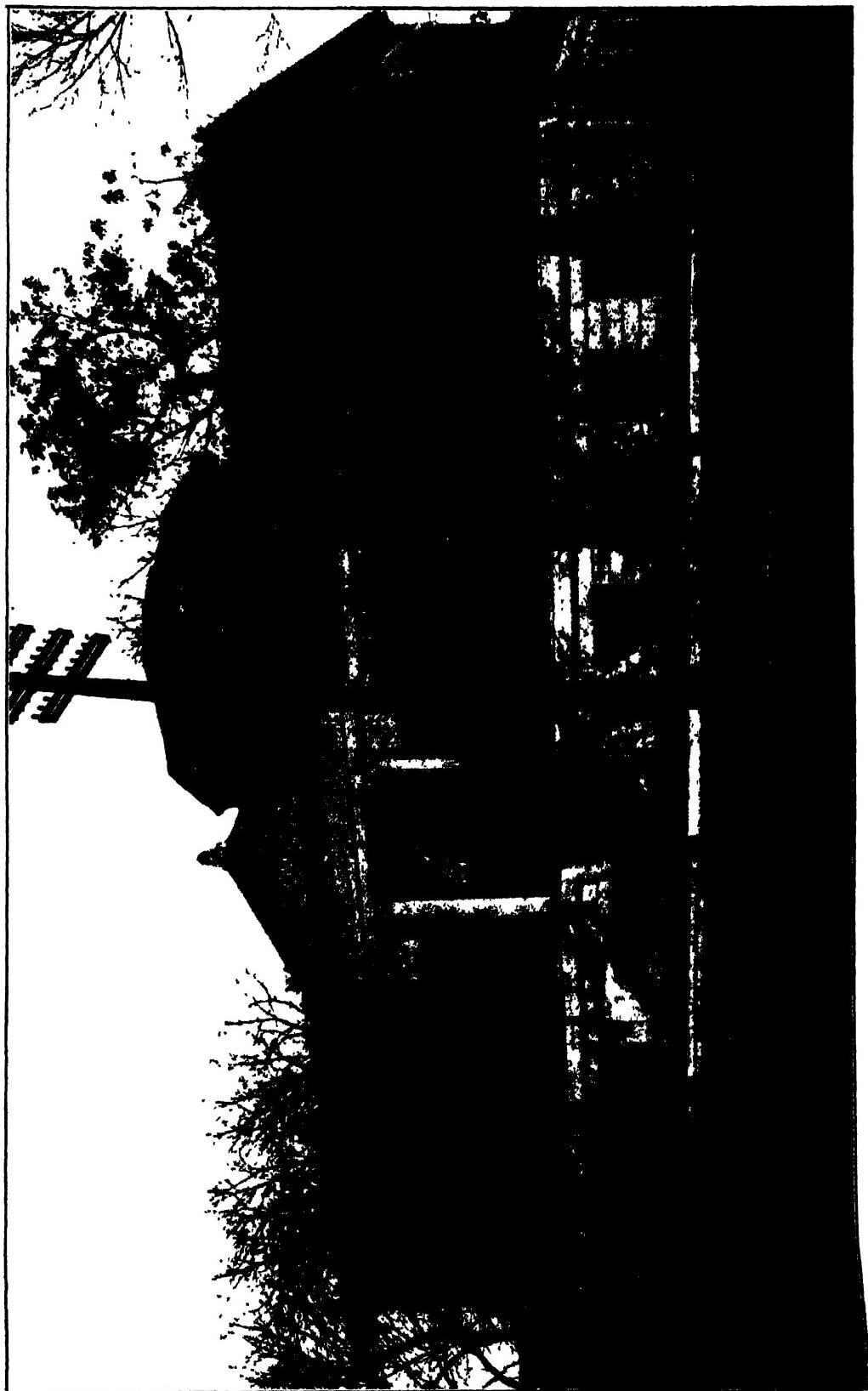
Lincoln, David Francis, American hygienist: b. Boston, Mass., 4 Jan. 1841. He was graduated at Harvard University in 1864 and at its medical school in the same year; and served as acting assistant surgeon in the United States navy during part of the Civil War (1864-5). He has published 'Electro-Therapeutics' (1874); 'School and Industrial Hygiene' (1880); 'Hygienic Physiology,' a school text-book (1893); 'Sanity of Mind' (1900), etc.

Lincoln, Jeanie Gould, American novelist: b. Troy, N. Y. She was married in 1877 to N. S. Lincoln of Washington, D. C., and has published 'A Chaplet of Leaves,' verse (1869); 'Marjorie's Quest' (1872); 'Her Washington Season' (1884); 'A Genuine Girl' (1886); 'An Unwilling Maid' (1897); 'A Pretty Tory' (1899).

Lincoln, Mary Johnson Bailey, American household economist: b. South Attleboro, Mass., 8 July 1844. She was educated at Wheaton Seminary, Norton, Mass., in 1864, was married to David A. Lincoln (now dead) in 1865, and since 1879 has been prominent as a lecturer and writer on household matters. She was the first principal of the Boston Cooking School, and is the culinary editor of the 'American Kitchen Magazine.' She has published 'The Boston Cook Book' (1884); 'Peerless Cook Book' (1886); 'Carving and Serving' (1886); 'The Boston School Kitchen Text Book' (1888).

Lincoln, Robert Todd, American diplomatist: b. Springfield, Ill., 1 Aug. 1843. He is the eldest son of Abraham Lincoln, and was graduated at Harvard College in 1864. He entered the Harvard Law School, but left it for the army and served on the staff of General Grant as captain. On the close of the War he resumed his legal studies and was admitted to the Chicago bar in 1867. He was secretary of war 1881-85; and although mentioned as a candidate for the presidency in the last-named year declined to allow his name to be placed in opposition to that of President Arthur. He was minister to Great Britain in 1889-93, and became president of the Pullman Palace Car Company in 1897.

Lincoln, England, an episcopal city and civic county, the capital of Lincolnshire, on the Witham, at the junction of several railroads, 120 miles north of London. It dates from pre-Roman times, was the Roman 'Lindum Colonia,' and at the time of the Norman Conquest, a fortified town of considerable importance. The principal edifice is the cathedral, crowning a height, on the summit and slope of which the town is built, 200 feet above the river. The cathedral dates from the 11th century and is chiefly early English but with interesting transitional phases, which are also to be seen in the various parish churches, the majority of which have undergone modern restoration. Other prominent buildings are the mediæval guildhall, the remains of the Norman castle, the ancient episcopal palace, the fine old Roman gateway spanning Hermin street, a theological college, school of



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art, and several benevolent institutions. The manufacture of machinery and agricultural implements forms the chief branch of industry. Pop. (1901) 48,784.

Lincoln, Ill., city, county-seat of Logan County; on the Illinois Central, the Peoria, D. & E., and the Chicago & A. R.R.'s; about 28 miles northeast of Springfield and 135 miles southwest of Chicago. The place was settled in 1835 and incorporated in 1865. It is situated in an agricultural region, and extensive deposits of coal are in the vicinity. The chief manufactures are cellulose, horse-collars, flour, mattresses, caskets and coffins, excelsior. The farm and dairy products and the coal mines contribute to the wealth of the city. Lincoln is the seat of the State Institution for Feeble-Minded Children; and of the Lincoln University, opened in 1865 under the auspices of the Cumberland Presbyterians. It has a free public library, the building a gift from Andrew Carnegie; a Deaconess Home and Hospital, Saint Clara's Hospital and Odd Fellows' Orphans' Home. Pop. 1890) 6,725; (1900) 8,962.

Lincoln, Kan., city and county-seat of Lincoln County; on the Saline River, and on the Union Pacific railroad; about 155 miles west of Topeka and 105 miles west of Wichita. It is in an agricultural region in which are raised large quantities of wheat and corn and a number of cattle. Limestone quarries in the vicinity contribute to the industrial wealth of the city. The industries and trade are connected chiefly with farm and dairy products and with live-stock. Pop. (1900) 1,262.

Lincoln, Neb., city, capital of the State and county-seat of Lancaster County; on the Chicago, B. & Q., the Chicago, R. I. & P., the Union P., the Missouri P., the Chicago & N. W., and other railroads; about 55 miles west of the Missouri River, and about the same distance north of the Kansas State line. The city, located in the midst of a fertile agricultural district, in the Salt Creek basin, at an elevation of 1,045 feet, rises gradually to the south and east, leaving the creek to the west and north. The location of the capital at this point was due in part to the numerous radiating branches of Salt Creek, but more especially to the saline springs which in early days furnished salt to the Indians and the buffalo, and later to the overland emigrants, and the early settlers of Nebraska. The site selected by a commission, 14 Aug. 1867, was surveyed the same fall; and, from the proceeds of lots sold at auction, the first capitol, the insane asylum, and the original university building were erected and completed by 1871.

Lincoln bids fair to fulfil the prediction of its founders by becoming a great railroad centre, as it already has 12 radiating lines, owned by five of the great corporations that now dominate in the West as already mentioned. With one exception each railroad has its own station and yard. The Chicago, B. & Q. repair and construction shops, employing 500 skilled mechanics, are located at Havelock, a suburb of Lincoln. Thirty-eight passenger trains enter, and the same number leave, Lincoln every 24 hours. Lincoln's railroad connections make it the great convention centre of the State.

The Name.—The names of Lincoln and Douglas are strangely associated in Nebraska history. The site selected for the capital in 1867 and named Lincoln is practically identical with the one proposed 10 years earlier to have been called Douglas. Thus the author of the law organizing the Territory of Nebraska failed to have his name perpetuated in its capital, but yielded that honor to his great rival.

Internal Appearance.—Lincoln is laid out, like most western cities, on the checker-board plan, with streets 100 or 120 feet in width. These broad streets are in general lined with trees and flanked with large lawns. The city contains an unusually large number of comfortable homes, excelling in this respect its development in business blocks. About 20 miles of the streets are paved—12.2 miles with brick, 3 miles with asphalt, and 5 miles with nearly worn-out cedar blocks. The waterworks are owned by the city; 50 miles of mains distribute the water from two deep wells, from which about 1,500,000 gallons of the very purest water are pumped per day. There are 40 miles of sanitary and 6 miles of storm-water sewers in the city.

The Lincoln Traction Company operates 37 miles of tracks, furnishes heat through conduits to the central section of the city, electric power and lights to public and private consumers, employs 100 men, and is capitalized at \$1,000,000. The following statistics suggest the character of the Lincoln Gas and Electric Light Company: 260,000 feet gas mains, 262,000 feet electric wire lines, 200 employees, and a capitalization of \$2,250,000. There are two telephone systems: one—"the Nebraska," in operation with 3,500 phones in use, and 140 employees; the other—"The Lincoln" (automatic), begins service 1 Jan. 1904, with 3,000 subscribers, and an investment of \$400,000. The city uses for municipal lighting 314 gas lights and 27 electric arcs.

Industries.—Manufacturing is of course yet in its infancy, but the total output per year will approximate \$5,000,000; in 1900 by United States census, \$4,105,951. A few industries are however well established. The making of leather goods, such as horse-collars, harness, etc., is not equaled west of the Missouri River. The production of oils and paints, mattresses and bed-springs, overalls and shirts, is large and developing rapidly. A large butter and creamery station is located at Lincoln. It receives cream from some 200 sub-stations, and makes two car-loads of butter per day. The jobbing and wholesaling industry is well under way, and in a few lines has reached creditable proportions. Lincoln, with 22 branch houses, is the largest distributing centre for farm machinery in the West. The jobbers in butter and eggs, fruits and groceries, are doing a good business. There is also a fair beginning in hats, hardware, drugs, furniture, coffins, paper, sash and doors, iron for plumbing, jewelry, crockery and queensware, lumber and coal. Two fair-sized grain elevators have recently been constructed. Total estimated business of jobbers and wholesalers for 1902, \$18,000,000. Lincoln is also becoming quite a centre for insurance business. Two strong life insurance companies, two fire insurance, three fraternal companies, including the Modern Woodmen with head-

LINCOLN—LINCOLN MEMORIAL UNIVERSITY

quarters here, and several mutual companies indicate the scope of development.

The banking capital is small for a city of its size: five commercial banks, capital \$500,000, surplus \$180,000, and deposits \$5,115,000, and one savings bank, deposits \$140,000, supply the business community.

Public Institutions.—The State fair grounds, the penitentiary, one of the insane asylums, and the Home of the Friendless are located in or near the city. The other public buildings are: the Capitol, costing \$750,000; the county courthouse, \$200,000; the United States post-office, \$150,000. The post-office becomes the city-hall, at a cost to the city of \$50,000, on the completion of the new Federal building for which Congress has appropriated \$350,000. The Carnegie library, \$75,000 and the grounds; 19 public school houses that cost from \$15,000 to \$50,000 each. Saint Elizabeth's Hospital, \$150,000, the Catholic Orphans' Home, and the Tabitha Home,—private institutions,—aid in caring for the sick and unfortunate. The mineral waters are used in several private sanitariums.

Amusements.—Outdoor—one small public park, the university athletic field, the Epworth Assembly park, and the "Country Club" grounds afford meagre facilities. The city supports one theatre and an auditorium.

Government.—The charter, granted by the legislature, contains no marked elements of interest. A mayor with large powers, a council of one house, and an excise board of three members, with the usual executive officials, control the city's public affairs. Taxes are 10 mills on the dollar of assessment, the last valuation showing the wealth of the city to be \$22,380,834. The total bonded debt is \$1,169,100, excluding about \$220,000 of paving bonds payable by abutting private property.

Education.—Lincoln is at present rather an educational than a business centre. Its population is largely American, representative of the North and Middle West. Neither great wealth nor extreme poverty is found. The public schools are efficient, and enroll 6,210 students. The high school employs 36 teachers, and registers 1,090 pupils, a number claimed to be unsurpassed by any city of its size. There are three musical conservatories, three universities, three colleges, one preparatory school and two parochial high schools, which tend to give a distinct educational tone to the public as well as private life of the city. The largest and most important educational institution is that of the State University and Agricultural College (q.v.). The campus contains 12 acres, and 8 buildings; there are two more under construction at cost of \$110,000. The farm of 320 acres has barns, dairy buildings, recitation halls, besides new buildings in course of construction, at a cost of \$100,000. (The legislature of 1903 appropriated in all \$824,000 for the biennium.) The calendar of 1902-3 shows 2,560 students in attendance. The Wesleyan University (q.v.), situated in University Place, a suburb of Lincoln, ranks next in importance, and enrolled 1902-3, 650 students. A third building is in course of construction. Union College (q.v.), a Seventh Day Adventist school, with three buildings and over 400 students, and Cotner University (q.v.), controlled by the Christian Church, with one good building and 200 stu-

dents, are prospering. The conservatories and other schools add several hundred more students to this list. The public libraries are: the University, 60,000 volumes; the State, 40,000; the City, 15,000; and the high school, 2,500. Lincoln's educational output is indicated in the second-class mail matter sent through its post-office. One per cent of all the second class mail matter of the United States originates in Lincoln. It requires 75,000 mail sacks to carry this matter for one year. In 1902 4,894,835 pounds of second class mail matter left the city. In all 66 publications are entered, one with 750,000 circulation, two others with about 150,000 each, and a fourth with over 100,000.

Religion.—There are 30 church buildings in Lincoln. The following organizations are represented: Methodists, 3 organizations; Congregational, 8; Presbyterian, 3; Christian, Baptists, Lutheran, Episcopal, Catholic, 2 each; United Presbyterian, Jews, Christian Science, Unitarian, Reformed, Swedish, Free-will Baptists, and several minor denominations, 1 each. There are 3 colored churches. The leading denominations all have exceptionally fine buildings.

Population.—Lincoln's growth has been somewhat irregular, yet counting decades gradual, Lincoln in 1867—then called Lancaster—contained only one store and some half-dozen dwellings. By 1870 it contained 2,441 people. In 1880, 13,004. The padded census of 1890 gave the city 55,154 population—a number too large by at least 20,000. In 1900 it had 40,169, and has grown rapidly since.

HOWARD W. CALDWELL,
Of the University of Nebraska.

Lincoln, Mount, one of the peaks of the Rocky Mountains; about 8 miles northeast of Leadville. Its height is 14,297 feet. A meteorological station is on the summit, and another on the lower level (13,500 feet). A railroad has been constructed to the silver-mining works at the summit.

Lincoln College, established at Lincoln, Ill., in 1866, under the auspices of the Cumberland Presbyterians. It has a preparatory department, and the college courses lead to the degrees of A. B., B. S., and B. L. In 1903 there were connected with the college 12 professors and instructors and 200 students. The library had about 3,500 volumes; the grounds, buildings, and apparatus were valued at nearly \$80,000; the productive funds were \$65,000; and the income from productive funds, tuition, and other fees, amounted to about \$6,000.

Lincoln Memorial University, a coeducational institution, at Cumberland Gap, in Claiborne County, Tenn. The university was chartered in 1897, but was not opened until the buildings were in such a condition as to accommodate pupils. The situation of Cumberland Gap (q.v.) makes it easy of access for students from Tennessee, Virginia, and Kentucky, and it is not far distant from West Virginia and North Carolina. Prior to the opening of this school there was within a radius of 50 miles fully 250,000 people without any well-equipped college, and except in a few places, no well equipped elementary school. The plan of the work is to maintain an institution which "shall promote research, investigation, and experiment for the ex-

LINCRUSTA-WALTON—LINDEN

tension and application of knowledge, and shall impart such instruction in the various branches of education as will tend to promote good society and good citizenship, and the ability to develop the abundant resources of the Southern States." The plan of erecting such a school was first started by Gen. O. O. Howard, of Burlington, Vt., who desired to see a school established some place easy of access for the mountaineers of this locality, because of the great interest which Abraham Lincoln had in the people of this section. The institution comprises three departments: the academic, the normal, and the industrial. There are several grades in the academic department. In the normal department teachers are trained; and in the industrial department, agriculture, carpentry, masonry, typesetting, and other trades, are taught to the boys and young men, and domestic science to the girls and young women.

The university owns 600 acres, and the buildings cost \$150,000. They include class rooms, saw-mills, shingle-mills, shops, etc. Andrew Carnegie contributed \$13,800. The present endowment fund is \$200,000. By working for the school in some of the industrial departments, the students can earn their tuition and board, or at least a part of the cost of their education.

Linrusta-Walton. See LINOLEUM.

Lind, Jenny (MADAME GOLDSCHMIDT, gold'shmit). Swedish singer: b. Stockholm 6 Oct. 1820; d. Malvern, England, 2 Nov. 1887. In very early childhood she displayed the faculty of tune and of musical memory in such degree as to attract observation, and at 9 her voice was considered so remarkable that she was admitted to the Stockholm Conservatory of Music as a pupil of Creelius and Berg. In spite of an apparent lack of individual attractions, which led the manager of the court theatre at first to demur, when he had heard her sing she was entered at the vocal school there, made rapid progress, and up to the age of 12 was frequently heard on the local stage. After years of thorough study and voice-building, in 1838 she made her debut, with great success, as Agathe in "Der Freischutz." As operatic star in Stockholm and other cities in Sweden and Norway, she extended her fame, and in 1841 studied for the greater part of the year in Paris under Manuel Garcia. She went to Berlin in 1844, studied German, and in Meyerbeer's "Feldlager in Schlesien" appeared as Vielka. During the next year she made a Continental tour which established her in a position of supremacy, her great successes being won in Dresden, Leipsic, etc., and finally in Vienna. In 1847 she made her first appearance in England, which was followed by a succession of unprecedented triumphs. Her tour of the United States (1850-2) brought her not only fresh honors, but also large financial returns, and is remembered to this day by many who shared in the material and spiritual benefits which her noble womanhood and artistic genius conferred. In 1852 she was married in Boston to Otto Goldschmidt (q.v.), then conducting the Bach choir, and virtually retired from her profession, though subsequently reappearing on special occasions. She returned to Europe; at length settled in London; and made her last public appearance at Düsseldorf in 1870. In 1894 a bust of her was unveiled in Westminster

Abbey. Consult: Rockstro and Holland, "Jenny Lind the Artist" (1891); Rockstro and Goldschmidt, "Jenny Lind, Her Vocal Art and Culture" (1894).

Lindau, lin'dow, Paul, German author: b. Magdeburg 3 June 1839. He studied philosophy and literature at Halle, Paris, and elsewhere, in 1872 established "Die Gegenwart," a weekly literary and political journal, and in 1878 "Nord und Süd," a monthly. Among his earliest works were pleasantly written books of travel, "Venice" (1864), "Paris" (1865), and later "The New World" (1884). But he is better known as a playwright and novelist, his subjects being taken almost exclusively from modern life. The most successful of his plays was possibly "Maria and Magdalena." His novels include: "Herr und Frau Bewer"; "Toggenburg" (1883); "Mayo," a romance cycle; "Berlin" (1886-90); and "The Brothers" (1894). In 1895 he became manager of the court theatre at Meiningen.

Lin'den, or Basswood, a genus of trees (*Tilia*) of the order *Tiliaceæ*, ordinarily known as basswoods in the United States. The species, of which there are about a dozen, are natives of the northern temperate zone, and more or less resemble each other in general appearance. They are characterized by alternate, usually heart-shaped, leaves with toothed edges; small yellowish, often fragrant, flowers in cymes; the peduncles of which are attached to membranous bracts; and globular nut-like fruits about the size of peas. The trees, in many horticultural varieties, are widely planted in Europe, where they are known to the English as limes, and have been introduced into America for their pleasing form and dense shade, and to some extent also because of their abundant yield of nectar, from which bees make one of the finest qualities of honey. They are also planted for their timber, usually called "whitewood," which is highly valued on account of its whiteness, lightness, toughness, and durability, and is used for turned and carved ornaments, and for making honey-boxes and other light articles the whiteness of which is desired to enhance the appearance of the goods they contain; also extensively used for carriage bodies, cabinet work, and interior parts of furniture. It makes a high grade of charcoal, used by druggists, gunpowder-makers, and artists. The fibrous inner bark is made into mats and cordage, and strips of it are widely used for tying plants, etc. When stock-food is scarce in early spring the twigs and budding shoots are often fed to farm animals, being very mucilaginous and nutritive, though liable, it is said, to injure the quality of butter made from the milk of cows fed upon them. The best-known species are the American basswood (*T. americana*), a stately tree often exceeding 75 feet in height and 10 feet in girth. Its range extends from New Brunswick to Minnesota and southward to the elevated lands of Georgia and Texas. In the more thickly settled parts of this region it is becoming scarce as a timber tree because of the great demand for its wood. In America it is the most frequently planted species. Owing to confusion in nomenclature, the name "European linden" is applied to at least three species, *T. platyphyllos*, *T. vulgaris*, and *T. ulmi-*

LINDLEY—LINDSEY

folia. The first is most widely planted in America. The last is very late in blossoming and should be more extensively cultivated in order to extend the season of honey production. Linden all thrive best upon good land. They are easily propagated from seeds, layers, and grafts, and by "stooling," the small trees being cut down close to the ground, the sprouts covered with soil, and when rooted removed to nursery rows.

In some countries the fibrous inner bark of the linden is separated by soaking in water, and manufactured into fishing-nets, mats, shoes, and clothing; and the cordage made from it is said to be remarkably strong and elastic. (See *BAST*.) The wood is sometimes cut into thin strips and used in the manufacture of chip hats, which resemble those made of straw.

Lindley, lind'lī, John, English botanist and horticulturist: b. Catton, near Norwich (Norfolk), 5 Feb. 1799; d. Acton 1 Nov. 1865. He became Belgian agent for a London seed merchant in 1815, later took up botanical studies, published in 1819 a translation of Richard's 'Analyse du Fruit,' and was appointed assistant librarian to Sir Joseph Banks at London. Later, he was successively made assistant secretary to the Horticultural Society (1822-41), professor of botany in the University of London (1829-60), and lecturer in botany to the Apothecaries' Company (1836-53). In 1828 he was elected to the Royal Society, whose royal medal he received in 1857, and in 1853 became a corresponding member of the Institut de France. He was appointed editor of the 'Botanical Register' in 1826, of the 'Journal of the Horticultural Society' in 1846; and in 1841 was a founder of the 'Gardeners' Chronicle,' whose chief editor he was until his death. He was an able lecturer, a constant opponent of the Linnaean as contrasted with the natural system of classification, and the author of several valuable works such as: 'The Theory and Practice of Horticulture' (1842), and 'The Vegetable Kingdom' (1846). He also wrote almost the entire descriptive portion of London's 'Encyclopædia of Plants' (1822-9).

Lindsay, lin'zā, Anna Robertson Brown, American author: b. Washington 20 Feb. 1864. She was graduated from Wellesley in 1883, subsequently studied mediæval literature at Oxford University, and was married to S. M. Lindsay (q.v.) in 1896. She has published: 'What is Worth While?' (1893); 'The Victory of Our Faith' (1895); 'Culture and Reform' (1896); 'Giving What We Have' (1897); 'What Good Does Wishing Do?' (1898); 'The Warriors' (1903).

Lindsay, or Lyndsay, lind'zā, Sir David, Scottish poet, usually described as "of the Mount" (an estate near Cupar in Fife): b. about 1490; d. 1555. He studied in the University of St. Andrews, and in 1509 became page of honor to James V., then an infant. In 1528 he produced his 'Dreme,' and in the following year presented his 'Complaynt' to the king. In 1530 he was inaugurated Lyon king-at-arms, and knighted, and in 1531 sent on a mission to Charles V. He published a drama entitled 'A Satyre of the Three Estatis,' played at court in 1539, and followed in 1536 by his 'Answer to the King's Flyting'; and by his 'History and Testament of Squire Meldrum'

(1538). His last work, 'The Monarchie,' was finished in 1553. For more than two centuries Lindsay was the most popular poet in Scotland. His satirical attacks on the clergy in some degree paved the way for the Reformation.

Lindsay, Harry. See *Hudson, H. L.*

Lindsay, Samuel McCune, American political economist and educator: b. Pittsburg, Pa., 10 May 1869. He was graduated from the University of Pennsylvania in 1889, and took post-graduate courses there and abroad. After his return to the United States he was appointed assistant professor of sociology at the University of Pennsylvania; he has also been editor of the department of sociological notes in the 'Annals of the American Academy of Political and Social Science' (1895-1901), and associate editor of the 'Annals.' In 1892 he was special agent of the United States Senate Finance Committee to report on wholesale prices in Europe; in 1899-1900 was expert of the Industrial Commission to report on railroad labor; and in 1902 was appointed commissioner of education to Porto Rico, being granted leave of absence from the University of Pennsylvania. He has written 'Railway Labor in the United States' (1902); 'Social Work at the Krupp Foundries'; 'The Study and Teaching of Sociology'; 'The Unit of Investigation in Sociology'; and other articles in the 'Annals of the Academy of Political and Social Science'; 'Report on Education in Porto Rico'; and other monographs.

Lindsay, William, American lawyer: b. Rockbridge County, Va., 4 Sept. 1835. He was educated in his native State; removed in 1854 to Clinton, Hickman County, Ky., where, after teaching school and studying law, he was admitted to the bar in 1858. Throughout the Civil War he served in the Confederate army, rising to the rank of captain and acting as a staff officer, and after the war returned to Clinton and resumed the practice of law. In 1867 he was elected State senator as a Democrat; in 1870 took his seat on the bench of the supreme court of Kentucky; and was chief justice of the State 1876-8, declining a renomination and returning to the practice of law at Frankfort. In 1889 he again entered the State senate; in 1893 served as commissioner of the World's Columbian Exposition; in the same year was elected to the United States Senate for the unexpired term of John G. Carlisle, who had resigned to become secretary of the treasury; and in 1894 he was re-elected, but differed with his party on the money question, and toward the end of his term usually voted with the Republicans. After leaving the Senate he went to New York city and once more resumed the practice of law. In 1901 he was appointed by President McKinley a commissioner for the Louisiana Purchase Exposition at St. Louis.

Lindsay, Ontario, Canada, the capital of Victoria County, a town and port of entry on the Scugog River, at the junction of branches of the Grand Trunk railroad, 57 miles (by rail) northeast of Toronto. It has important lumber interests, saw and grist-mills, tanneries, carriage works, manufactures of agricultural implements, and carries on a considerable river, canal, and lake traffic. Pop. (1901) 7,003.

Lindsey, lin'zi, William, American merchant and author: b. Fall River, Mass., 12 Aug.

LINDSBORG—LINEN

1858. He engaged in business in 1877, and after removing to Boston, in 1886, devoted his leisure to writing. He has published 'Apples of Istan-khar' (1895), a volume of poems; and 'Cinder-Path Tales' (1896), stories of athletic sports.

Lindsborg, līnz'bōrg, Kan., city, in McPherson County; on the Smoky Hill River, and on the Missouri Pacific and the Union Pacific R.R.'s; about 115 miles southwest of Topeka, and 64 miles north by west of Wichita. It is in an agricultural region, and its trade is chiefly in live-stock, grain, broom-corn, flour, and dairy products. It has large brick and lumber yards and grain elevators. An important industrial establishment is the Bethany Book Concern, the Western publishing institution for Lutheran literature. There are a number of Swedish Lutherans in Lindsborg. It is the seat of Bethany College, opened in 1881 under the auspices of the Lutherans. Among its departments, that of music is well known for its annual concerts, when the students render the 'Messiah.' Pop. (1900) 1,279.

Lindsley, līnz'lī, John Berrien, American educator: b. Princeton, N. J., 24 Oct 1822; d. 7 Dec. 1897. He was graduated from the University of Nashville in 1839 and received his degree in medicine at the University of Pennsylvania. Studying theology, he was ordained to the Presbyterian ministry in 1846 and preached for several years. He became professor of chemistry in the University of Nashville in 1850, and was chancellor of the institution 1853-73. He was likewise professor of chemistry in the University of Tennessee 1880-97, and of *materia medica* in the Tennessee College of Pharmacy 1896-7. He published 'Our Ruin: its Causes and Cure' (1868); 'The Military Annals of Tennessee' (1886).

Line, Mathematical. In geometry, a line may be defined (1) as the locus described by a moving point; (2) as a magnitude which, at each of its points, has extension in one direction only; (3) as the boundary which separates two contiguous parts of a surface; or (4) as the intersection of two surfaces, or of a surface with itself. Each of these definitions has its own merits, and geometers use one or another of them, according to convenience.

In physics, "lines" of various kinds are constantly referred to, but in many cases the context sufficiently indicates the sense in which the word is used. A "line of force," in a field of electric or magnetic force, for example, is a line whose direction, at every point, coincides with the direction of the force at that point. The field is conceived to be filled with such lines, so that through every point of the field one such line passes, and only one. In the mechanical theory of heat (see THERMODYNAMICS) the state of a homogeneous body, with respect to its temperature, to the pressure exerted upon it, and to the volume occupied by a unit of its mass, is often represented by means of a diagram in which two of these quantities are taken as abscissa and ordinate, respectively. In such a diagram an "isothermal" line is a line along which the temperature of the body remains constant; an "adiabatic" (or "isen-tropic") line is one which is so drawn that if the body should pass through the succession of states that the line represents it would not at

any moment either absorb or emit heat. An "isopiestic" (or "isobaric") line is a line along which the pressure to which the body is exposed remains constant. An "isometric" line is one along which the volume of the body remains constant.

In steam engineering the various parts of the diagram that is drawn by an indicator are designated as "lines," although they are but the several parts of a single line. Thus the "admission line" is that part of the diagram which the indicator draws while steam is being admitted to the cylinder; the "expansion line" is that part drawn while the steam in the cylinder is expanding; the "exhaust line" is that part drawn while the cylinder is in free communication with the atmosphere (or with the condenser); and the "compression line" is that part which the indicator draws after the exhaust valve has closed, and before the admission valve from the boiler opens again. The "atmospheric line" upon such a diagram is the line that the indicator draws when disconnected from the engine, and in free communication with the atmosphere.

Line of Beauty, in art, an ideal line frequently represented in the form of a very slender elongated letter S.

Linen, a cloth of very extensive use, made of flax, and differing from cloths made of hemp only in fineness. Hemp is in part now used in manufacturing cloths which are called linen, although the coarser hempen fabrics, as canvas, sail-cloth, etc., do not bear that name. In common linen the warp and woof cross each other at right angles; if figures are woven in it is called damask (q.v.). The species of goods which come under the denomination of linen are table-cloths, plain and damasked, cambric, lawn, shirting, sheeting, towels, etc. Linen cloth, or cloth woven of combinations of cotton or other textile fabrics with linen, is printed in the same manner as calico. Fancy cloths are also made by weaving with yarns dyed of various colors, and sometimes with printed yarns. Linen is extensively manufactured in England, Scotland, and Ireland. It is also a staple in various parts of Europe.

The beauty of linen consists in the evenness of the thread, its fineness and density. The last of these qualities is sometimes produced by subjecting it to rolling, hence linen with a round thread is preferred to that with a flat thread. The warp or woof is not unfrequently made of cotton yarn, which renders such stuff, called union cloth, less durable. In a historical view linen is interesting from its use by several nations in their religious ceremonies. The Egyptian and Jewish priests wore it at all their religious ceremonies, hence the former are styled by Ovid and Juvenal, "linen-wearing." Linen was an article of export from Egypt in the time of Herodotus. From Egypt the use and manufacture of linen probably passed to the Greeks and Romans, but the use of linen did not become common at Rome till late in the history of the republic. The Roman priests wore linen garments at that time. Among the Greeks a linen tunic was a regular part of the male costume as early as the Homer period. Linen was also used as a material for writing, as shown by the Roman *libri linteui*, "linen books." The mummy bandages, covered with hieroglyphics,

LINES — LINGULA

are also proofs of this use of linen. In the Middle Ages linen and woolen cloth formed the chief materials for dress, and fine linen was held in very high estimation. Germany and Brabant then carried linen manufactures to the greatest perfection.

The weaving of linen has been practised in Great Britain for a very long period, beginning with the Anglo-Saxon times, but though the manufacture has been much extended since the introduction of machinery, its expansion is limited by the greater cheapness and convenience in many respects of cotton. The English linen industry owed much to Flemish weavers, who settled in England at various times from the 11th or 12th century onward. The chief seat of the English linen manufacture is Leeds and its neighborhood, where spinning is carried on on a very extensive scale. A single room in one of the factories at Leeds is said to cover two acres. Ireland and Scotland, however, are much larger manufacturers of linen than England.

Linen was woven in Ireland as early as the 11th century. The manufacture was improved by the refugees who left France on the revocation of the Edict of Nantes, and it was patronized by the Duke of Ormonde. The manufacture never really flourished till it was carried on in mills, and by the aid of machinery. The value of linen goods now exported from Ireland to Great Britain is estimated at about \$50,000,000 annually.

Dundee is the seat of the Scotch linen manufacture, and its progress there has been extraordinary. The manufacture appears to have been introduced into Dundee some time about the beginning of the 18th century. In 1745 only 74 tons of flax were imported without any hemp, the shipments of linen cloth during the same year being estimated at about 1,000,000 yards. In 1791 the imports of flax amounted to 2,444 tons, and those of hemp to 299 tons; the exports that year being 7,842,000 yards linen, 280,000 yards sail-cloth, and 65,000 yards bagging. From this period the trade began to extend itself gradually, though not rapidly.

The introduction of machinery in the linen manufacture is of recent origin. It followed the adaptation of machinery to the manufacture of cotton, but as there were some special difficulties to be overcome, an interval took place between the invention of the various cotton machines and their adaptation to the linen manufacture. The machinery used both in spinning and weaving linen is in general, however, the same as that used for cotton. See TEXTILE INDUSTRY, AMERICAN.

Lines, Edward Stevens, American Protestant Episcopal bishop: b. Naugatuck, Conn., 23 Nov. 1845. He was graduated from Yale in 1872 and after two years spent in the Berkeley Theological School, at Middletown, Conn., was ordained in 1874. He was rector of Christ Church, West Haven, Conn., 1874-9 and of St. Paul's Church, New Haven, 1879-1903. In November 1903, he was consecrated bishop of the diocese of Newark, which comprises the northern half of New Jersey.

Lines of Force. See FORCE.

Ling, a sea-fish (*Lota molva*), resembling a pike in shape and 3 to 4 feet long, but a member

of the cod family (*Gadidae*). It abounds around the British coasts; its fishery approaches in importance and resembles in methods that for cod. Great quantities are preserved by drying, salting, etc.; and an excellent oil is extracted from the liver.

The name is also given to the eel-pout or burbot, another species (*L. vulgaris*) so-called not only in Europe but in northern New York. See Burbot.

Linga, ling'ga, an emblem commonly used in the sectarian worship of the Hindus. It represents the male or generative power of nature. Originally of an ideal and mythical nature, it has degenerated into practices of the grossest description; thus taking the same course as the similar worship of the Chaldaeans, Greeks, and other nations. The manner in which the linga is represented is generally inoffensive—a pillar of stone or other cylindrical objects being held as appropriate symbols of the generative power of Siva. Its counterpart is "Yoni," or the symbol of female nature productive. See also SIVA.

Lingard, ling'gärd, John, English historian: b. Winchester 5 Feb. 1771; d. Hornby, Lancashire, 17 July 1851. He was educated for the Roman Catholic priesthood at Douay, was ordained in 1795 and was first stationed at Newcastle-upon-Tyne. Here he published in 1805 'Catholic Loyalty Vindicated.' His next work of importance was 'Antiquities of the Anglo-Saxon Church.' His greatest work, the 'History of England from the Invasion of the Romans to the Year 1688,' printed in 8 vols. (1819-30), reached a fifth edition in 1850, when it appeared in 10 vols. It has since been regarded as a valuable work of reference by historians of all parties. It possesses for Protestant historians the valuable quality of giving the views on controverted points of an able and well-informed Catholic writer. The 1850 edition of the history was elaborately revised by the author. Apart from the sympathies of the writer, the work is universally regarded as one of high authority. He refused a cardinal's hat offered him by the pope, but accepted a pension of £300 a year from the queen.

Lingayén, lin-gä-yän', Philippines, a pueblo and the capital of the province of Pangasinán, Luzon, situated on an island of the delta of the Agno River, formed by one of the outlets of the river and the Gulf of Lingayén. It has a fine parish church and the buildings generally are well constructed, many being of stone. The Manila and Dagupan railroad has a station within eight miles at Dagupan, and Lingayén is the converging point of several important highways and has frequent communication by water with Manila. It has therefore an important trade. Pop. 18,900.

Lingayén, Gulf of, an arm of the China Sea indenting the western coast of the island of Luzon, Philippines, north of Manila Bay. The width of the entrance from San Fernando Point to Santiago Island is 20 miles. The east coast is mountainous; the west coast is generally level and less elevated and is fringed by low wooded islands, the channels between which are navigable for native coasters. Typhoons are prevalent in September and October.

Lin'gula. See BRACHIOPODS.

LINIERS Y BREMONT — LINNET

Liniers y Bremont, Santiago Antonio María de, sán-té-ä'gō àn-tó-né-ô mà-ré-ä dà lén-é-ärs' è brá-mönt', Spanish naval officer: b. Niort (Deux-Sèvres), France, 6 Feb. 1756; d. near Buenos Ayres, Argentine Republic, 20 Aug. 1810. After the French Revolution he entered the Spanish naval service, in which he attained captain's rank. He defended Montevideo against the British in 1806, and in 1807 forced them to relinquish Buenos Ayres, which they had occupied. The ruling viceroy was then deposed by popular demand, and Liniers selected for the post (16 May 1808). The British soon attacked Buenos Ayres, and, 1 July gained a battle under its defenses; but Liniers successfully managed the resistance and the enemy, after a retreat and large losses, withdrew from the country. He was succeeded in 1809 by Cisneros, whose rule was followed by the revolution of 10 May 1810. Liniers thereupon marched from Cordobá to Buenos Ayres for the purpose of quelling the revolt; but was captured, and shot.

Linley, lin'li, Thomas, English composer: b. Wells 1732; d. London 19 Nov. 1795. He was a pupil of Chilcot at Bath and of Paradies at Naples, became one of the best English vocal instructors, and for several years directed the concerts at the Bath assembly-rooms. In 1774 he became joint director of the Drury Lane oratorios, in 1776 purchased Garrick's share in Drury Lane, and in 1776-91 directed the music there. His music contributed greatly to the success of Sheridan's "Duenna," which was performed 75 times during the season. He also composed the much admired accompaniments to the "Beggar's Opera," various other music for dramatic works, and glees, canzonets, and songs. He obtained high place among English composers through his simplicity and excellent taste.

Linlithgow, lin-lith'gō, Scotland, the county town of Linlithgowshire, 16 miles west of Edinburgh. It is an ancient royal burgh, with a fine 12th century Gothic church, and other historical edifices, chief of which is Linlithgow Palace (mostly rebuilt between 1425 and 1628), the birthplace of James V. and Mary Stuart. Pop. (1901) 4,279.

Linn, James Weber, American author and educator: b. Winnebago, Ill., 11 May 1876. He was graduated from the University of Chicago in 1897 and since 1899 has been instructor there. He has published "The Second Generation," a novel (1902); "The Chameleon" (1903).

Linn, William Alexander, American journalist: b. Sussex, N. J., 4 Sept. 1843. He was graduated at Phillips Academy, Andover, Mass., in 1864, at Yale in 1868, and in 1883 was admitted to the New York bar. From 1868 to 1891 he was engaged in newspaper work, during part of that time being on the staff of the New York *Tribune*, and was managing editor of the *Evening Post*, 1891-1900, resigning to devote himself to literary work. He was a member of the New Jersey commission of 1899, by which, together with the Interstate Commission, of which he is a member, the passage and enforcement of laws for the prevention of the destruction of the Palisades were secured. He is a contributor to agricultural and horticultural papers, and has also written "The Story of the Mormons" (1902); "Rob and His Gun" (1902); and "Horace Greeley" (1903).

Linnaeus, li-né'üs, Carolus, the Latinized form of the name of Carl von Linne, Swedish botanist: b. Rashult, Småland, 12 May 1707; d. Upsala 10 Jan. 1778. He showed an early interest in botany; entered the University of Lund, where his botanical tastes were encouraged by Kilian Stobæus, physician to the king, from whose library he was supplied with necessary books. In 1728 he went to Upsala, where he undertook the supervision of the botanic garden. Here he made the acquaintance of the botanist, Rudbeck, whose assistant he became, and assisted Olof Celsius in the preparation of the latter's "Hierobotanicon." Aided by the Academy of Sciences at Upsala, Linne made a journey about 4,600 miles through Lapland, the result of which was shown in his "Flora Lapponica," published 1737. In this year he went to the University of Harderwyk in Holland and took an M. D. degree, and later visited Leyden, where he published his first sketch of his "Systema Naturæ" and "Fundamenta Botanica." In 1736 he visited England, and in September 1738, settled in Stockholm as a physician. He slowly acquired a practice, was made naval physician of Stockholm, and obtained some minor appointments. He became professor of medicine at Upsala in 1740, and of botany in 1741. He was ennobled in 1737. During his professorship of botany he drew students from all over the civilized world, increasing the number attendant on the university from 500 to 1,500. The importance of Linnaeus' work can scarcely be overrated. It has been said that "he found biology a chaos; he left it a cosmos." He it was who established the systematic botany and zoology of modern times. He first announced the principles for the definition of genera and species, and established the binominal nomenclature of both. He was a careful observer, a methodical worker, and a clear and succinct writer. As a teacher he was of great influence in revolutionizing the methods of botanical study. He published more than 180 works, among which the most important are: "Systema Naturæ" (1735); "Fundamenta Botanica" (1736); "Genera Plantarum" (1737); "Flora Lapponica" (1737); "Classe Plantarum" (1738); "Philosophia Botanica" (1751); and, chief of all, "Species Plantarum" (1753).

Linnell, lin'el, John, English painter: b. London 16 June 1792; d. Redhill, Surrey, 20 Jan. 1882. He began his artistic career as a pupil of West and Varley and was for some time a successful teacher of drawing, numbering among his pupils Mary Wollstonecraft Shelley. He had painted from his 15th year confining himself exclusively to landscape. Between 1824 and 1838 he produced a number of excellent pictures in this class. Originally an imitator of Gainsborough, he soon developed a brilliantly original style. He was particularly successful in portraying the insular sky scenery of England with its varied cloud forms, and changing play of sunlight, and his works combine delightful freshness with supreme skill in handling. In the South Kensington Museum is one of his pictures, "Girls Gathering Flowers," and in the National Gallery are his "Wood Cutter," and "Windmill." Consult: Story, "Life of John Linnell" (1892).

Linn'et, a very common and attractive song-bird, one of the smaller migratory finches,

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of southern Europe and adjacent countries of Africa and Asia. In autumn and winter the plumage is brown-streaked and dull, but in the spring molt, on the approach of the breeding season, the breast and head of the mature male become bright crimson. This gay dress is assumed and put off gradually, and bird-catchers speak of brown, gray, red or rose linnets as if they were separate species, but there is only one—*Linota cannabina*. The name refers to the fondness of the bird for hemp, flax-seed, and the like, formerly called the “lint” crops, whence comes the Scotch names “lintie,” “lintwhite,” etc., and the English “linnet.” The habits of these birds in the fields are much the same as those of their relatives the American goldfinches, or of the redpolls, called “linnets” in Canada. These are among the most prized of cage-birds for the sake of their song, and are taken in great numbers in traps as well as extensively bred. They will interbreed with the canary and an interesting and valuable hybrid has thus been produced. The song is loud, flute-like and exceedingly agreeable; it consists of several connected strains, and is esteemed by connoisseurs in proportion to the frequency with which certain clear sonorous notes, or “crows,” recur. It sings throughout the year, except when molting, and may be taught various airs and melodies not its own—even to imitate well the complicated song of the nightingale. Such education is rarely given it, however, except in Germany. The care and feeding of a linnet should be the same as those given a canary. See CANARY; CAGE-BIRDS.

Linnet-hole, in glass making, a table connecting the glass-melting furnace with the arch.

Lino'leic Acid, one of the constituents of linseed oil, obtained by saponifying the oil with soda, separating the soap, and decomposing it with chloride of calcium. After washing, the soap is treated with ether, which dissolves the linoleate of calcium. This salt is next decomposed with hydrochloric acid, and the linoleic acid taken up by ether. After distilling off the ether the oily acid remains, which is converted into a barium compound which is purified by crystallization, and from this the acid is finally got by addition of sulphuric acid. It is a pale-yellow oil, insoluble in water, but readily soluble in ether. It is lighter than water, has a slight acid reaction and harsh taste.

Lino'leum, a kind of floor-cloth introduced in England in 1860. It consists of a mixture of oxidized linseed oil and ground cork spread in a uniform layer upon canvas, the surface of which may be printed in patterns of different colors as in ordinary floor-cloth. The oxidizing of the linseed oil, by which process it becomes a caoutchouc-like substance possessing a certain amount of elasticity, is effected by exposing it in thin films to the influence of air. Certain proportions of kaurigum, rosin, and pigments, according to the ground color desired, are added to the oxidized oil, which is then intimately mixed with the ground cork, and firmly squeezed on and rendered adherent to the surface of a rough canvas backing, which is afterward coated or waterproofed with oil paint. An embossed linoleum, washable, waterproof and warm, invented by Frederick Walton as a substitute for wall paper, is named after him “Lincrusta Walton.”

Linosyris, in botany; *Goldylocks*; a genus of *Composites*, sub-order *Solidagineae*. The achenes are compressed and silky, the pappus in a double row pilose, the involucre of one row of scales, surrounded by several long ones, or imbricated; the florets all perfect, deeply five-cleft, yellow. Ten species known from Europe and the West of Asia.

Lin'otype, a machine, operated by finger keys, which automatically produces and assembles, ready for the press or stereotyping table, type metal bars, each bearing, properly justified, the type characters to print an entire line. The linotype is the invention of Ottmar Mergenthaler. Beginning in 1876, he perfected his device in 1886, the first newspaper to use it being the New York *Tribune*. The device has since been greatly improved by means of spacing facilities, etc., and is adapted for book work as well as for newspapers. Its manipulation may be roughly approximated to that of a typewriter. The linotype does not set type. It produces a slug or line of metal upon which the characters to be printed stand out after the fashion of reading matter for the blind. See COMPOSING MACHINES.

Lin'sang, one of the beautiful spotted civets of the Oriental genus *Prionodon*, of which various species are to be found from northern India to Borneo. The West African linsang (*Poiana poensis*) is a rare species from the Fernando Po district, which is closely allied to the Malayan ones. They have the general characteristics and habits of the civets (q.v.) but are especially expert in tree-climbing and feed mainly upon birds.

Lin'seed, or Linseed Meal. See FLAXSEED.

Linseed Oil Industry, The. In the commercial world there are known at the present time a number of vegetable oils, which in the raw state and without the aid of chemicals are capable of absorbing the oxygen of the air to a greater or less degree, and commonly called “drying oils.” By far the most valuable to commerce, both as to usage and results obtained, is the linseed oil expressed from the seed of the plant “*Linum usitatissimum*,” the common term generally applied to this seed being “flax seed,” and probably due to the fact that early in our history the plant was commonly referred to as the “flax plant,” the object of its cultivation at that time having been principally for the flax fibre. Although the great commercial importance of linseed oil, due to the large increase of manufactured products in which it is used, has been of but comparatively recent years in this country, the seed or plant bears the hall mark of great antiquity. While there is no specific reference to linseed, it is positively known that certain drying oils had been discovered prior to the Christian Era and probably in times of remote antiquity, and, though uncertain, it would seem reasonable to assume that linseed was among them, especially as the climate of the countries where the oil seeds were found was warm and moist, and exactly suited to its growth. The first authoritative mention of linseed is made by Dioscorides, a mediæval writer on medicine, living in the time of Augustus; descriptions, however, of certain decoctions of linseed alone are given, and the resultant oil is not distinctly described. In fact, this applies to

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most writers of that and later periods. They were students of natural history and medicine, and undoubtedly gave little thought to the commercial value of the oil, especially as there was at that time very little use for it. For example, Hippocrates mentions only the use of bruised linseed as a medicine of astringent properties. Pliny speaks simply of the juice of the linseed. For centuries it appears that the oil's greatest characteristic, its wonderful drying properties, was given little attention. In the second century Galen speaks only of it as being "in its nature, drying," and in the fifth, Actius, a medical writer, though distinctly describing it in connection with art, passes completely over this important point. For many years following this century, however, painting and medicine remained almost solely in the hands of the monks. Having plenty of leisure time, and guided perhaps by the expressions of former Greek writers, these monks experimented to some extent on the siccative qualities of linseed, which resulted in its limited use with other oils, principally as a preservative varnish for gilt and paintings in fresco and tempera. It was not, however, until the 12th century, when oil painting was discovered, that we may say a true appreciation of the essentially exclusive properties of linseed was felt, and from that day to this it is the only oil that has successfully satisfied all the requirements of oil painting; and, remarkable though it may seem, genius has for nearly seven hundred years sought for a substitute, either elementary or in combination, which would entirely fulfill all conditions of commerce, but without success. Whether a substitute will ever be found is extremely doubtful, and it is a well-known fact that there is no adulterant for linseed oil, inasmuch as the smallest admixture of any other oil is highly injurious to its peculiar qualities.

Manufacturing—In its early history the uses for linseed oil were few and the quantity consumed insignificant, the growth of the industry being appreciable only within the past century. In earlier years the small amount required, principally by the artists, was produced by little, if any, apparatus, and often in the studio. Later, the oil began to find more enlarged fields of usefulness, and the crudest of mechanical apparatus was devised for its manufacture. With such appliances, however, oil could be produced only at an excessive cost, and its use on a broad commercial basis was not feasible. Indeed, up to within comparatively recent years the invention and improvement of linseed oil machinery has been slow, and in fact to the United States may be attributed the greater part of the advance made in this industry in the past 100 years. The early settlers of this country, coming, as most of them did, from the flax growing countries of Europe, brought with them the primitive press which had been used by their fathers and forefathers, and upon which no improvements worth mentioning had been made. In this industry, as in many others, the United States has taken the lead, and the machinery now in use is better adapted to the purposes than in the older countries of Europe, where to-day, in fact, one may see in places the ancient oil press used by our grandfathers. The earliest method recorded for the production of linseed oil is a receipt by Theophilus, a monk writing in the 12th century,

and which becomes particularly interesting when we find that the treatment of the seed or method was almost identically the same as it is to-day. "Take linseed and dry it in a pan without water, on the fire; put it in a mortar and pound to a fine powder; then replace it in the pan, and pouring a little water on it, make it quite hot. Afterward, wrap it in a piece of new linen, place it in a press used for extracting the oil of olives, of walnuts, or of the poppy, and express it in the same manner." It will be seen from the above that the seed was treated separately four times as follows: Dried, crushed, cooked and pressed. With the exception of the drying, which is not necessary, the plan of procedure to-day is the same. During the intervening years, however, many different methods have been used as well as different kinds of machinery.

In the making of linseed oil there are two very essential steps which must be carefully watched; the first is the crushing or grinding of the seed; the second, is the cooking or "tempering" of the ground seed. In the proper manipulation of these two processes rests a crusher's ability to make a good yield of oil. Years ago the present day yield of oil would have been deemed impossible. Although the contrivances for grinding the seed were in early years as primitive as the presses with which they were used, and although many improvements have since been made, yet the grinding was fairly well done, and it seems that the light yields of oil in former years were not due so much to the grinding of the seed as to the lack of, or improper, tempering. Heat and moisture are of the greatest importance in producing the best yields; we find, in fact, that many times the ground seed or meal was pressed entirely without cooking. Oil made in this manner was called "cold pressed" oil. That such oil, however, was made through any lack of proper cooking devices or ignorance, is extremely doubtful. In years gone by little was known about the chemistry of linseed oil, but it was noticed that in the cold process the oil expressed was beautifully light in color and heavy in body; furthermore, upon boiling to a high temperature the oil did not darken but became lighter, and after mixing with the varnishes was perfectly clear and without sediment. On the contrary, oil made from the tempered meal was thinner and darker in color; on boiling at high temperatures it darkened still more, and threw down a quantity of white and greasy precipitate. Such oil of course was looked upon with suspicion; it was considered by many unfit for most uses and was never used in good varnishes. Owing to the light yield of oil in the cold process, however, the price was excessive, and for this reason much attention was devoted to the refining of the oil made by the hot process, so that it might be used in high grade goods and for particular work. For many years, however, careful men remained strongly prejudiced against hot tempering; in later years this prejudice gradually disappeared, but it was only when practical and successful processes had been invented, whereby the objectional features could be removed from the hot pressed oil. During this period, however, many thousands of gallons of the hot pressed oil were manufactured, to be used where quality was a small consideration and price of the greatest importance; in fact, an

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insufficient quantity of the cold pressed oil was made to supply the demand, and Calcutta oil, which has the same properties as cold pressed oil, was imported in large quantities to make up this deficiency. In these days of sharp and bitter competition, a crusher depends almost entirely upon his yield to make his profit; consequently, all oil is made from the tempered meal, and the best equipped mills are supplied with chemical or mechanical apparatus which converts the hot pressed oil into refined oils almost equal in quality to the old time cold pressed oil. Small amounts of Calcutta oil are still imported, but the price is much higher than the domestic refined, which gives perfect satisfaction and which in the near future will undoubtedly be used to the exclusion of all others.

Probably the first attempt to manufacture linseed oil in quantities considerably in excess of that produced in the earliest times and by means of the crudest apparatus, was by the ancient screw and lever press. This was simply a modification of the old cider press and consisted of a barrel, sometimes of cast iron, perforated to give a free outlet to the oil, and fitted with a plunger which, when actuated by the screw, descended into the open barrel upon the mass of meal contained therein, and by means of slow pressure thus exerted expressed a reasonable amount of oil. This press was worked by a hand lever placed through an eye at the head of the screw, like a bar in a capstan. Little oil was secured, however, in comparison with presses actuated by machinery, where the pressure is many times greater than can possibly be secured by hand. On this account considerable oil remained in the dry residue known as oil cake; these weighed about 25 pounds each and were about 18 inches in diameter by 8 inches thick, resembling a cheese in shape and thus giving to it the name of "Cheese Box" press. The capacity of this press was small indeed, amounting to less than one barrel of oil a day. The date cannot be definitely stated when the screw and lever press was first used, although linseed oil was undoubtedly first made by it in this country. It was retained in use as late as 1848. Many years prior to that date, however, the improved Dutch mill or wedge press had come into vogue. These mills were imported early in our history from Holland, where in some places they may be still seen in actual use, and were at that time considered a great improvement over the old screw and lever presses. The wedge press as it was introduced to America consisted of a very heavy rectangular frame work of oak or iron, placed horizontally on its base. The ground seed was shoveled by hand into woolen bags and these were placed in the press so as to hang vertically between hinged partitions, consisting of wooden plates. The capacity of the press was about nine or ten of these bags, and giving a daily pressing of not over 15 to 20 bushels. The cake manufactured in this press weighed from 8 to 10 pounds each, after the raw edges had been trimmed. The pressure requisite for the expression of the oil was obtained by driving wooden wedges between the plates by means of sledges driven by wind or water power.

It is impossible to state at just what time the wedge press was discarded for the horizontal hydraulic press, the next step in the advance-

ment of the industry and undoubtedly the most important. Linseed oil, however, was made by this process as late as 1853. In 1796 the first hydraulic press was built. This brought about great changes in many industries as well as in the manufacture of linseed oil. The first presses were indeed very small affairs in comparison with those now in use, but their invention was an epoch maker in the linseed oil industry. The earliest type used was similar to the old screw and lever press in shape, and of the cheese box variety. It is doubtful, however, in the absence of authentic records, that this variety was used in this country for linseed. Probably the first hydraulic presses used in the United States for linseed oil were of the horizontal type, having been installed in a New York mill shortly after the war of 1812. In these presses the plates were of iron instead of wood, and movable; the ground seed was shoveled into the woolen bags as before, but flattened by the hand of the workman and placed in mats of horsehair, which were folded in book form. After placing in the press vertically, one at a time, the iron plates were moved up against each bag, when the ram of the hydraulic cylinder moving horizontally compressed the eight or nine cakes contained in the press, the oil running into a trough or pan beneath. Very simple hydraulic pumps were used at that time to generate the pressure; the yield of oil, however, was very much increased by this method, it being practically impossible to secure a sufficiently high and steady pressure by the old wedge and screw process. The horizontal press, however, though an improvement over these methods, had its disadvantages. In 1851 the first patents for vertical hydraulic presses for linseed oil were granted. The capacity was not increased over the horizontal type at this time, the press holding only 6 to 10 cakes. The clumsy and unwieldy manner of packing the meal in the bags and filling the presses, however, was done away with. What is known as "boxes" were used, the ground seed being molded into soft cakes, packed in wrappers and placed in the press, one above the other, the boxes acting as shelves. A large saving was made here in labor and time, necessarily resulting in considerable increase of capacity and consequent reduction in the cost. With the improvements in the manner of pressing the seed came improvements in grinding or crushing. For many years undoubtedly the mortar and pestle of Theophilus was used on some basis; this, however, was very crude, and took an unnecessary amount of labor. Linseed was crushed first in this country by rolling through a mill worked by hand; the rollers in this mill consisted of one large and one small, the seed being passed through once or twice, according to the views of the crusher. This mill in the earliest time was probably used with the screw and lever press. The earliest method for reducing the linseed to meal by machinery was that used in connection with the Dutch mill or wedge press, and was called the "Tamper" mill. This was a mortar and pestle on a large scale. The mortars were of heavy cast iron, the bottom flat on the inside and holding a small amount of flax seed; the pestle was an iron-shod log, standing vertically in a frame, the foot resting on the bottom of the mortar; these logs, weighing from 150 to 200 pounds each, were raised, by means of

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cams on a horizontal log, by water or wind power, and falling of their own weight exerted a crushing or grinding force upon the seed. The tampers, as they were called, numbered one or more in the set, according to the size of the mill. As in the case of the screw and wedge press, however, this method was found entirely inadequate to the needs of the oil mill. The capacity of a mill was necessarily cut down very much by such a slow process, and rolls run by machinery were resorted to; these were of different design from the old hand rolls, and were designated in the trade as "cracker" rolls, for the reason that they cracked or opened the seeds. These rolls were arranged in pairs only and varied in size from 12 to 18 inches in diameter and 7 to 18 long, according to the views of the manufacturer. After being bruised in these rolls, the seed was placed in an edge-runner or chaser, also known as a "Muller" stone. This consisted of a circular trench of iron, several feet in diameter, placed horizontally on a firm foundation. Running around this, like a wagon wheel in a rut, were two ponderous iron shod wheels, 5 to 6 feet in diameter with steel tires 10 to 16 inches wide. These were sometimes made of stone and set opposite one another on a shaft and weighed about 7,000 pounds each. Around and around these wheels revolved, chasing one another until the meal was finely crushed and rolled, when water was added until the meal acquired the consistency of putty, or what was termed as "dobby." It was then mixed or "mulled" for some 10 or 15 minutes and then tempered. These Muller stones proved very satisfactory as to results, but were clumsy and took a great deal of power; furthermore, the expense of two grindings was unnecessary. Nevertheless, no change was made for many years.

The tempering or cooking of the crushed seed having such an important bearing on the yield of oil, has also suffered many changes. In the earliest times many different devices of the crudest workmanship were used, often no more nor less than large cooking utensils; there was also considerable variation in the temperature used, from cold to hot, according to the manufacturer. Often the spontaneous heat of the crushing was considered sufficient. In the tamper of the Dutch mill water was played on the meal in the mortar, when vapors began to arise, in order to keep it from getting too hot and thus spoiling the oil. No further tempering was considered necessary. Later, however, and notably in connection with the Muller stones and wedge press, regular cookers began to be used; these were heavy sheet iron drums or tanks, slowly revolving over a charcoal fire until the proper temperature was attained. With the advent of the hydraulic press, however, improvements were made in cooking devices and stationary heaters began to be used in which the meal was cooked by steam. Up to the year 1856, and as related, the cooked meal was placed in the bags by hand; at this date, however, a device was patented to form the cooked meal into soft cakes or molds preparatory to placing them into the cloth or wrapper which was to take the place of the bags originally used. This was considered a great boon, saving as it did, the laborious process of handling and molding the meal by hand to fit the press; though somewhat clumsy at that time,

the "molder" or "former" has been much improved. Where in former years the molder was run by power from the shaft, now hydraulic pressure is utilized, and the "former" is in reality a miniature press, consisting of a square mold or box into which a plunger presses the required amount of meal. Very light pressure is sufficient, and it is so arranged that the cooked meal will not be compressed beyond the point where the oil is separated.

The tempering, crushing and pressing of linseed was carried on, with a few exceptions, substantially as related up to the year 1878, when the most lasting improvement to oil machinery was made, and which introduced practically the system in use at the present time; namely, the "Lawther" process. Greater economy was immediately secured and larger yields of oil. The old Muller stones and cracker rolls gave way to the stack of "four or five high" chilled iron rolls, by means of which the seed was bruised three or four times in one process. Apparatus for controlling and regulating the high pressure was introduced; kettles or cookers were steam jacketed and had larger heating area, and steam was fed into the meal to moisten as well as heat it. The plate press had also been given the preference over the box press, which was clumsy. Although the very best mills to-day have some improvements over the original Lawther process, they make rather toward greater economy than increase of yield. The modus operandi in the largest and most complete mill to-day is as follows: The flax seed is first thoroughly cleaned by separators and dust collectors until the original dirt, amounting to 10 or 20 per cent, has been reduced to less than one per cent, and which is considered as clean as it is practical to make it. This seed is now passed through the rolls, there being about one set of five rolls high to every three presses. The ground seed falling from these rolls is led by screw conveyors into the steam jacketed cookers of large capacity and holding a considerable quantity, where it is tempered. This consists of heating the ground seed to a temperature of from 120° to 180° F., according to the quality of the seed used, and moistened with live steam, all the time being kept in constant motion to prevent burning. When the temper is considered perfect a batch is made. This consists of drawing off the cooked meal on to the formers and molding the cake; these molders are the latest design and are very rapid in action. A piece of cloth somewhat wider than the molded cake is placed so that the tempered meal may be drawn out onto it. This cloth or wrapper, as it is called, is a substitute for the horse hair cloth and woolen bags of former days, but now made of pure camel's hair to stand the high heat and enormous pressure. By a single motion the former is now closed and immediately reopened, when the ends of the cloth protruding are wrapped around the soft cake and it is placed in the press. The batch consists of making 20 of these cakes, which fills one press. The pressure is now turned on by an automatic valve or change cock, which slowly increases the pressure up to about 4,000 pounds to the square inch. This enormous pressure is generated by very powerful hydraulic pumps, connected to what is known as the accumulator system. The accumulators are for two purposes; first, to act similar to a

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safety valve on a boiler, preventing the pressure from exceeding the limit; secondly, keeping the pressure at a steady level throughout the time the seed is in the press, and preventing the pressure from decreasing one pound. Before the adaptation of the accumulator and change cock, the oil was pumped directly into the press, causing an unequal flow and consequent reduction in the yield of oil. Six presses are generally grouped, one being emptied and refilled every ten minutes, the six thus completing one hour in time and allowing each press in the group to drain every 50 minutes. In some mills seven batches are made instead of six, and the weight of the cake is also increased from 11 and 12 to 14 pounds. This is done in order to increase the capacity of the mill, but generally at a sacrifice in yield of oil. As each batch is removed from the press, the camel's hair cloth wrapper is stripped off, the rough edges of the cake trimmed automatically, and the cake piled up in the cake house, where it is allowed to cure or dry for at least 48 hours. The raw oil, after having been run from the settling troughs at the back of the presses, is carefully filtered and placed in tanks ready for barreling.

The Oil and Its Uses.—Linseed oil as manufactured may be classified under three headings: raw, boiled and refined. Raw linseed oil is the term applied to oil as it comes from the press in its original state. The principal consumer of raw linseed oil is the paint grinder; as it was used as a vehicle for paint hundreds of years ago, so it is used now. Every year millions of gallons are spread on our houses and public buildings in the form of mixed paints, one concern alone using over 1,500,000 gallons yearly. Every 100 pounds of white lead contains at least $7\frac{1}{2}$ gallons. Boiled linseed oil is, as the name denotes, raw oil boiled over a fire, chemicals being added, the object being to increase its drying properties. Many formulae are used by the different crushers for making boiled oil, the oldest and most reliable, however, containing principally red lead and black oxide of manganese, the addition of these metals to the heated oil stimulating the linoline and increasing its affinity for oxygen. The uses for boiled oil are many and varied, but it is principally used as the drying oil in paints. The refined or varnish oils are many, and there is the greatest rivalry to-day among oil manufacturers as to the qualities of their respective varnish oils. Hundreds of thousands of gallons of these oils are used every year. While the different gums used in the manufacture of varnishes are the basis or foundation, some variety of refined oil is the most important component of the varnish. As stated before, raw linseed oil has certain component parts which must be removed; there are many ways of doing this. Descriptions, however, of these methods will not be attempted, as they pertain more particularly to the chemistry of linseed oil and not to its manufacture. The reliable varnish oils are few and are furnished only by the largest manufacturers. Linseed oil in some form plays a very prominent part in the manufacture of linoleum and oil cloths also. Varnish oils are used in the manufacture of patent leather, for shoes and other purposes, carriage tops, and all kinds of dressed leathers are finished with linseed oil. The oil clothing worn by sailors and fishermen is soaked with it. It

appears by the thousands of gallons before our eyes in the printers' ink on newspapers, and smaller quantities are used in the manufacture of oil silks. Strange to say, linseed oil has no value as an edible oil, or as an illuminant or lubricant. In a few instances we find linseed oil used fresh from the press as a cooking oil and even as a substitute for butter, but mostly by foreigners, notably Russians or Poles; it is needless to say, however, that the consumption in this way is most insignificant. As an illuminant it is useless, burning only at high temperatures with much smoke and giving a poor light. As a lubricant it has no value, although sometimes used as an adulterant, but its drying qualities are obviously the reverse of those required of a good lubricating oil. While not very large in comparison with other industries, the consumption of linseed oil in the last few years as compared to former years has increased very rapidly, and at the present time the above industries consume annually an amount computed at nearly 62,000,000 gallons. The price of linseed oil is of course governed by the cost of manufacture and principally by the price of seed and cake. Large fluctuations in the price of a commodity are generally very injurious to the trade in such commodities. While the fluctuations in linseed oil have been very large at times, the growth of the industry has been such that no great apparent injury has been done. Probably the highest price ever obtained for domestic raw oil was \$2.03 per gallon in 1867, the price having risen gradually from \$1.00 per gallon in 1861. These prices were, of course, war prices, and after 1867 steadily declined, ranging from 60 to 70 cents as high, and 40 to 50 cents as low. It is a remarkable fact that in these days of great production, manipulation has succeeded in placing the price as high as 82 cents in 1901, the highest since 1870. Owing to the somewhat limited and narrow market for domestic linseed, such manipulation is often brought to bear, and it is the earnest desire of every crusher that this may be eliminated to some extent in the future. The lowest price at which linseed oil has ever sold in its history was in 1867, when actual sales were made on the basis of 24 cents per gallon in wooden barrels. This of course was due largely to the financial panic together with large crops at that time and prices rapidly recovered to a normal basis. The greatest fluctuations experienced in earlier years was in 1867, when oil went from \$1.00 per gallon to \$2.03, and in later years, in 1901, when it went from 50 to 82 cents per gallon. Linseed oil has always been subject to great fluctuations, and it will be seen by averaging that from 1876 the annual fluctuation has been about $14\frac{1}{2}$ cents per gallon, the smallest fluctuation known being in 1883, when there was only 3 cents difference in price at any time during the year.

The Cake and Its Uses.—While really a by-product, the manufacture and sale of the cake is equal in importance to the sale of the oil, and although netting a smaller price per pound, the value has a very great influence on the course of oil prices and the policy of the business as a unit. Practically the only use for cake is as a food for live stock, principally cattle, for fattening and for results in the dairy. The actual protein in cake is about 36 per cent, of which about 85 per cent is digestible and the nutritive

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value is consequently several times that of hay, while the fat varies from 4 per cent to 8 per cent, according to the crusher. Although used extensively abroad, it is a singular fact that our farmers in the United States have little, if any, appreciation of its value. Our own country should be the largest consumer of this most valuable by-product; actual figures, however, show that only about 20 per cent is retained for home consumption. The first cost is somewhat greater than for other food stuffs, and our farmers as a general rule lack the knowledge of its value, which comes only by experiment and valuable experience. The manurial value alone of linseed oil cake has been estimated at over \$16.00 per ton, whereas the first cost is only from \$18.00 to \$25.00 per ton. Our farmers, it is true, are waking up to its value and more is being used in this country every year, but the bulk of our output is marketed in two very small countries, Holland and Belgium. It is impossible to ascertain the exact quantities of linseed cake exported in the early years of the industry, as all oil cake and oil cake meals were classified under one head. It is, however, fairly safe to assume that by far the larger part of the output each year in the proportion of about 38 to 40 pounds of cake per bushel of seed crushed was sent out of the country; this from the fact that only in recent years has our farmer become educated to its use.

While the two little countries of Holland and Belgium take at the present time about 67 per cent of the cake consumed in all the other countries of Europe, this demand has been of but comparatively recent years. The United Kingdom in years gone by was considered the only market, and Holland and Belgium used only small quantities. For instance, in 1895 only 20,000 tons were shipped to Belgium and 9,000 tons to Holland, whereas in 1896, 115,000 tons were consumed in the United Kingdom. The United Kingdom, however, has reduced her demand ever since that time, while Holland and Belgium have taken rapid steps. From 20,000 tons in 1895, Belgium has increased to 100,000 tons in 1902, and Holland from 9,000 tons to 86,000 tons, while the United Kingdom dropped to about 50,000 tons. As stated, the exportation of cake has grown with the industry and the proportion of export remains practically the same, with the exception that each year a little more is retained for home consumption. The total exports in 1895 were about 120,000 tons, and in 1902 about 290,000 tons. A glance at the figures will show that of the total 290,000 tons the three countries above mentioned consumed 242,000 tons, the balance being divided largely between France and Germany with 18,000 tons each, Canada and West Indies 5,000 each, and Norway, Sweden and Denmark insignificant amounts. It is quite remarkable that so much of our cake finds its way to foreign markets, as the competition is severe, Russia, Germany and England together crushing many millions of bushels of seed annually. In England at least, however, the explanation is simple; more attention is paid to the richness in oil of the cake than in America. The oil is the most valuable product; consequently, with characteristic aggressiveness the Americans proceed to express all of it, or nearly all, leaving only about 6 per cent to 8 per cent in the cake. The result is a

much harder cake with considerably less oil in than in that made by our English cousins. This accounts in a great measure for the decrease in the United Kingdom consumption of our cake, and also owing to larger importation of the cheaper cottonseed meal which contains a greater percentage of oil. For some reason, however, the dry, hard American cake seems to be just the correct thing for growing, fattening and feeding cattle for the dairy. The quiet Dutchman prefers our cake above all others, and one need only to look at the figures to prove this statement. It is a very peculiar thing that the use of oil cake is not as general as it seems it should be. Like the American farmer, the Dane for instance will hardly touch it. He claims it spoils the flavor of the milk when fed for this purpose, and although good for fattening is too high priced as compared to cottonseed meal. How it is that Denmark holds the opposite opinion from Holland and Belgium is difficult to explain; it would seem, however, that the immense quantity used by the above mentioned countries, and the world-wide reputation of their dairy products, should conclusively settle the question, and it is altogether probable that on the basis of digestive economy, linseed oil cake is the best food of its kind on the market to-day.

Growth of the Industry.—As stated before, the early settlers brought with them the knowledge of making linseed oil. As the uses then were but limited, very little attention was given to the oil; the flax plant was grown for the flax and not for the seed and oil. In 1719 the spinning wheel was first introduced in New Hampshire by the Protestant Irish who settled there, and flax was grown more abundantly. The seed was for the most part exported, a few thousand bushels only being necessary to fill the home oil wants. The first impetus to the growth of flax for linen fabrics and consequent increase in seed and oil was given in 1722, when bounties for its growth were granted. The increase was immediate, and the plan worked so well that the bounties were continued, and in fact increased, until in 1751 we find it reported that sixty wagon loads of seed were exported at Baltimore. In 1752 a further increase was noted, 10,000 hogsheads or 70,000 bushels of seed being exported from Philadelphia. Twenty years later, 110,000 bushels were sold to the foreigner, and in 1791 292,000 bushels, or upwards of one half of the total crop of the United States in 1860, which was 567,000 bushels. Some idea of the rapid growth after the Revolution will be gained from the fact that in 1791 only 450 gallons were exported, while in 1795 nearly 50,000 gallons were sent abroad, an amount which was not again equaled until sixty years later. In 1792 the invention of the cotton gin placed a severe check on the growth of flax for the fibre, cheapening as it did cotton and cotton fabric. Undoubtedly at this time closer attention was paid to the flax seed for its oil bearing seed; the business was a profitable one, as had been shown by the small export business done. From 1795 the export steadily decreased, showing ever increasing home consumption, and in fact considerable quantities were now being imported. From about 80,000 gallons in 1825, they increased to 3,200,000 gallons in 1867. Short crops and high prices during the war of 1861-5 undoubtedly affected the im-

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portation of oil to some extent, but the indication is that there was a heavy demand for the oil which had to be filled. As the case in many other industries, the protective tariffs had a great effect on the production of linseed oil. In 1861 a duty of 16 cents per bushel was placed on flax seed, and 23 cents per gallon on linseed oil. Owing to the fact that very short crops of seed had been grown during the War of the Rebellion, and to the fact that business started up with a boom soon after, large quantities of oil were imported regardless of the duty,—1,150,000 gallons in 1866 and 3,200,000 gallons in 1867. Immediately after this, however, the imports dropped to an insignificant quantity, and have continued so to this day, a certain quantity of Calcutta oil only being imported each year at high prices, for special uses, it being a well known fact that the finest oil in the world is made from East Indian seed. It should also be noted that from 1861 to 1892 practically no seed was exported; it is also interesting to note that though in 1871 a duty of 20 cents per bushel, and in 1897 of 25 cents per bushel was levied, this country continued to import seed in respectable quantities, having reached as high as 4,166,000 bushels in 1895. The conclusion is obvious. The tariff on oil effectively eliminated the foreign competition; the crops of seed grown could not supply the demand; the price of seed goes up and the farmer is encouraged to plant it, while the duty on the seed for import holds that quantity down to an amount necessary to fill our shortages only. By glancing at our statistics, we are surprised to note that although a high duty has been levied on incoming flax, the growth of the industry has been such that until very recent years we have been obliged to call on the foreigner for some of our supplies. In 1839 the first cargo of flax was imported, and from 1854 to 1891 we have been obliged to call for, from one to three million bushels annually, with the exception of 1882 and 1883. In 1895 we needed 4,160,000 bushels to fill our consumptive needs. It is useless to make any estimate, which would approach with any degree of accuracy, the amount of flax seed grown in this country from year to year; this is due to the fact that the figures on record are sometimes estimated in one way and sometimes in another. It will be sufficient to say, however, that from 1880, when the crop grown in this country aggregated some 7,000,000 bushels, we have increased to at least 30,000,000 bushels in 1903. In 1902 the crop grown was estimated at about 25,000,000 bushels; prior to that time, however, and as far back as 1880, the average was about 10,000,000 bushels each year. By taking an average of the available crop used for crushing, after adding the imports and deducting the exports, we find that the average consumption amounted to eight to ten million bushels of seed up to about the year 1892. From that time the statistics seem to show a steady increase in the consumption, until at the present time it would appear that from 22,000,000 to 24,000,000 bushels are crushed, or in the neighborhood of one and one-half million barrels of oil.

Price of Seed.—While at times the fluctuations of seed prices has been caused by heavy speculation and manipulation, the law of supply and demand has generally fixed the value. The earliest quotations of which we have an authen-

tic record are for the year 1855; at that time Cincinnati was the principal centre for the sale of the seed. From about 1870 Chicago became the great market, its location being more central and better adapted for its marketing. Ten years later, however, Chicago lost its prestige, and Duluth, the wonderful city of the Northwest, has become practically the only market, located as it is at the head of the Great Lakes, which gives splendid shipping facilities for the large crop grown in the large states of North and South Dakota and Minnesota. The highest price obtained for linseed in modern times was in 1862, when sales were made on a basis of \$3.25 per bushel. From 1862 to 1874 seed never sold under \$2.00 per bushel but averaged about \$2.50; after 1874, however, prices steadily declined until 1886, when \$1.03 was reached. The lowest price ever obtained was in 1897, when seed went to about 63 cents. The greatest fluctuation was in 1862, seed going from \$1.25 to \$3.25, or a difference of \$2.00. Flax seed has never fluctuated less than four or five cents a year, and this condition has prevailed but seldom. In speaking of the great increase in the crops of seed grown, it is interesting to note in a general way its peculiar migratory nature. In earlier times, almost all the seed was grown in the Eastern States; large amounts were grown in New York, whereas now scarcely any is grown there. Ohio long held a good share of the crop; from Ohio it traveled to Indiana and Illinois; then Kansas, and from there to Minnesota and Dakota, and finally, in the last few years, almost the entire crop has been grown in the great States of North and South Dakota, Minnesota, and Manitoba. The historical records furnish us with very meagre data as regards the number of mills in operation at different periods. In 1810, the census tells us there were 383 mills in 14 States, 171 in Pennsylvania alone. These mills of course were very small affairs, but the number is conclusive of the healthy growth and the large interest taken in this industry. These mills made 770,000 gallons of oil, valued at about \$900,000. No better index of the growth of the industry can be had than a comparison of the following figures: In 1860 there were 94 mills, turning out nearly \$6,000,000 worth of oil and cake; in 1870 the number of mills was reduced to 85, but the value of the products had increased to \$9,000,000 worth of oil and cake, and in 1880, 81 mills produced \$15,400,000 worth of products. The number of mills was still further reduced in 1890 to 62, making \$23,500,000 worth of oil and cake, and in 1900 it is estimated that 48 mills were producing the splendid total of nearly \$30,000,000. The steady decrease in the number of plants in operation is due of course to the weeding out of plants with poor and old fashioned machinery and those unable to work on the lowest basis of cost manufacture for various reasons. There are at the present time not over 30 mills in actual operation, and combining in the aggregate some 730 presses. In measuring capacity, the unit is generally a hydraulic press. Each press of standard size, containing 20 cakes, is capable of handling in the best managed mills about 40,000 bushels annually, if run 300 days in the year. As in many other industries to-day, there are two controlling interests concerned in the production of linseed oil, the combine and the independents. Between these

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two elements the annual crop of flax seed is crushed and placed on the market. The number of presses computed for the combine is about 360. The independents number about 410 presses, out of which number the three largest independents operate 236 presses, or about 60 per cent. A comparatively small number only of the above presses, however, are equipped with the full number of 20 plates; every mill, therefore, if run full could not crush the maximum of 40,000 bushels per press. Many mills have only 16 plates, and for the purpose of approximating the correct figures it will be safe to estimate that fully 60 per cent of the total number of presses operated have a capacity 80 per cent of the standard size. It will be seen, therefore, by computation, that on this basis the actual crushing capacity of all the presses in actual condition to run is over 27,000,000 bushels. As some few mills run a larger quantity by operating seven batches or more and running heavier cake, it is probable the actual capacity of the machinery in use is nearly 30,000,000 bushels, or from 6,000,000 to 8,000,000 bushels in excess of the amount required. Necessarily, such condition of affairs causes many of the mills to run only part of the year and some of them to shut down entirely. Not over ten years ago a mill containing 12 presses was considered a good size, and 24 presses was considered very large; in fact, there are very few mills in operation to-day that number more than the latter figure. The largest mill in the world is located in Buffalo, N. Y., and operating steadily the large number of 138 presses, having a capacity of 6,000,000 bushels of flaxseed, and turning out about 15,000,000 gallons of oil annually. The four principal crushing points, as shown by the number of mills and amount of crushing capacity, are Buffalo, Chicago, Minneapolis and New York, the number of presses in operation in Buffalo being 203, with capacity of over 8,000,000 bushels of seed. Minneapolis is second with about 120; Chicago next with 113, and New York fourth with 108, or a total of 544 out of the entire number of 770 presses, the balance being scattered over the country at various points. See also FLAXSEED; OIL.

SPENCER KELLOGG,
Of Spencer Kellogg, Buffalo, N. Y.

Linsey, the name of an English country-made fabric of linen warp and worsted filling.

Linsey-woolsey, a mixed fabric made of linen and wool.

Linsley, James Harvey, American naturalist: b. Northford, Conn., 5 May 1787; d. Stratford, Conn., 26 Dec. 1843. He was graduated from Yale College in 1817, and became a Baptist clergyman, but on account of increasing ill-health resigned from the pulpit and devoted himself to the study of natural history. Many catalogues of mammalia and birds from his pen may be found in the 'American Journal of Science.'

Linsley, Joel Harvey, American clergyman: b. Cornwall, Vt., 15 July 1790; d. Greenwich, Conn., 22 March 1868. He was graduated from Middlebury College in 1811, and was tutor there for three years; afterward studied law, but in 1822 was licensed as a Congregational clergyman and went to South Carolina as a

missionary. During the years 1824-32 he was pastor of a church in Hartford, Conn., and was at Park Street church, Boston, 1832-5. In the latter year he was elected president of Marietta College, Ohio, which post he held 10 years, raising a considerable fund for the institution.

Linstock, a gunner's forked staff to hold a match of lint dipped in saltpeter.

Lint, in surgery, the scrapings or ravelings of fine linen, made into a sort of cloth, and used by surgeons in dressing wounds. It is made into various forms, which have different names, according to the difference of the figures. Lint made up in an oval or orbicular form is called a plect; if in a cylindrical form, or in shape of a date or olive-stone, it is called a dossier. The advantages of this material are very great, owing to its softness of texture, the ease with which it can be folded or rolled into any shape required, its capacity to absorb discharges, and its cheapness, on account of which it may be thrown away when once used. For modern surgery, it is rendered antiseptic by steeping in carbolic acid, perchloride of mercury solution, etc., and subsequent drying.

Lint-doctor, a sharp-edged ruler on the delivery side of the calico-printing cylinder, to detain any lint or fibres which may come off the cotton cloth.

Lin'tel, in architecture, a horizontal timber or stone over a door, window, or other opening, to discharge the superincumbent weight.

Lin, Richard, American journalist: b. Libertytown, Md., 30 March 1859. He was educated in Baltimore schools and at Liberty Academy. From 1877 to 1880 he served as an observer in the United States Weather Bureau, and since 1883 has been engaged in writing for newspapers and magazines, to which he has contributed short stories, etc. He has also published 'Rocky Mountain Tales' (1892); 'Boer and Britisher in South Africa' (1900); 'Best Recitations' (1902); and 'Educational Encyclopedia of Common Things' (1903).

Lin'ton, Eliza Lynn, English novelist: b. Keswick, Cumberland, 10 Feb. 1822; d. London 14 July 1898. In 1858 she married William James Linton (q.v.), but they separated in 1867, though continuing to retain friendly relations until his death. She was connected with the press for nearly all of her literary career, writing for the 'Saturday Review' the celebrated 'Girl of the Period' papers. She sometimes dipped her pen in acid, but in private she was warm-hearted and self-sacrificing. Among her numerous works are: 'The World Well Lost'; 'The One Too Many'; 'In Haste and at Leisure'; 'The Girl of the Period'; etc. Her best novels are: 'The True History of Joshua Davidson: Christian and Communist' (1872); and 'Autobiography of Christopher Kirkland.'

Linton, Sir James Dromgoole, English painter: b. London 26 Dec. 1840. He was educated at Cleveland House, Barnes. He afterward studied art, and has done much to promote the interests of the English school of water-color painting. He was elected a member of Institute of Water-color Painters (1867). When it was reorganized, its title being henceforth the Royal Institute of Painters in Water-colors, and its exhibitions being thrown open to everybody, not confined, as hitherto, to mem-

LINTON — LION

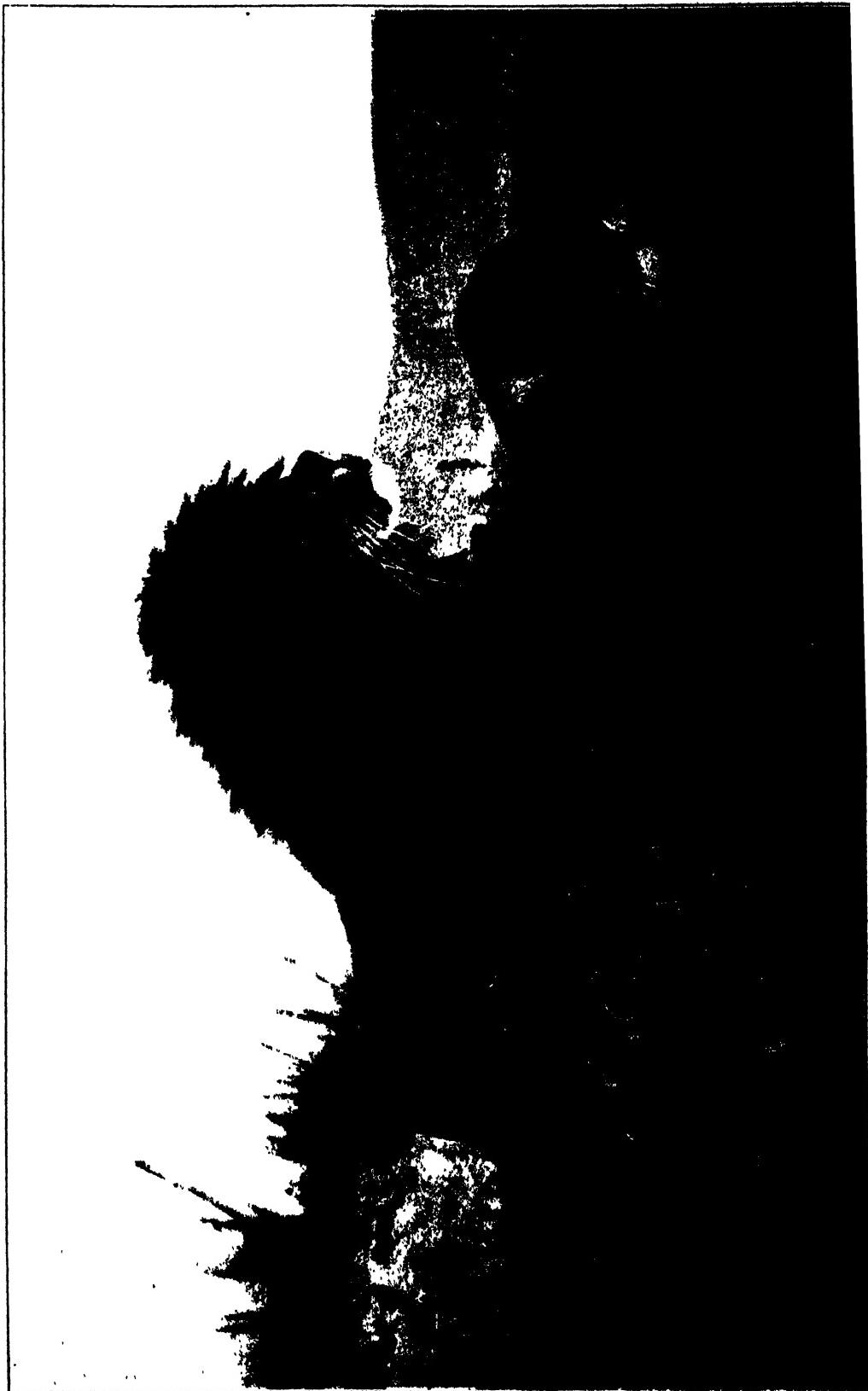
bers, he was chosen president (1884). In the following year he was knighted. His pictures in oil include the "Marriage of the Duke of Albany" painted in 1885, and a series of panels illustrating 16th century history for a private mansion at Nottingham.

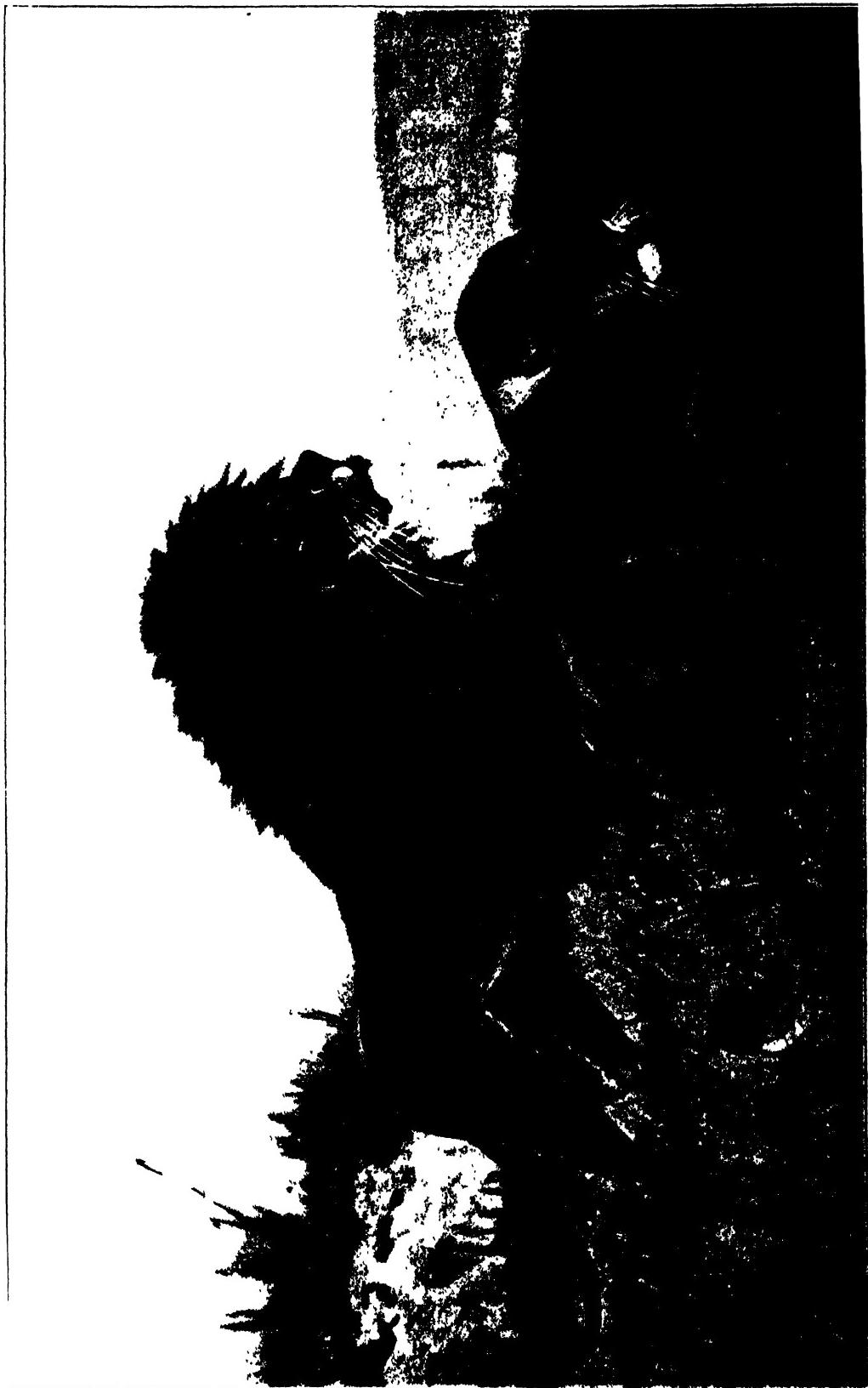
Linton, William James, Anglo-American wood engraver and author: b. London 1812; d. near New Haven, Conn., 29 Dec. 1897. As a wood engraver he took very high rank, and some of his finest work may be found in the pages of the "Illustrated London News," to which he frequently contributed from its commencement till he came to the United States in 1867. As an author, in which capacity he was more widely known than as an engraver, the zealous Chartism of his youth tinged much of his earlier work. Among his works may be cited: "The Plain of Freedom" (1852); "Claribel and other Poems" (1865); "The English Republic"; "Some Practical Hints on Wood Engraving" (1879); "Life of Thomas Paine" (1879); "A Manual of Wood Engraving" (1884); "Poems and Translations" (1889); and "The Masters of Wood Engraving" (1890).

Linz, lints, Austria, the capital of Upper Austria, on the Danube, 98 miles west of Vienna. It is defended by detached forts extending over a circuit of 9 miles, and has an old cathedral, a new cathedral, provincial parliament house, castle, town-house, bishop's palace, etc. The manufactures include woolen, linen, silk, and cotton goods, machinery and hardware, and there is an extensive trade on the Danube. Pop. (1900) 58,788.

Lion, the largest and most celebrated of the cat tribe, forming the widespread species *Felis leo*. The outward form and appearance of the lion are familiar. The apparently excessive size of the head, due chiefly to the great mane which covers the head, neck and shoulders of the males; the uniform, unmarked, tawny color of the skin; the great development of horny papillæ upon the rasp-like tongue; the growth of long hair on the elbows and along the middle line of the belly, and the tuft at the extremity of the tail (hiding a horny spine) are distinctive external characters. The length of the lion from nose to tip of tail, rarely, if ever, exceeds 10 feet, and that of the lioness 9 feet, of which the tail forms a third. The older books separated a supposed species of maneless lion, especially one in India designated the maneless lion of Gujarat; but the development of the mane varies greatly, some lions in all regions having this feature much more abundant than others, and in all cases it is a product of age, appearing fully only when the animal has reached full maturity at the age of five to seven years, so that no distinction of this kind is valid; nor can any be made upon color, the mane in certain specimens being very much darker than in others without regard to locality, dark and amply maned and scantily maned individuals belonging sometimes to the same litter. The period of gestation in the lions is five months. Only one brood is produced annually, and from two to four young are produced at a birth. The mother nourishes the whelps for about a year; their size at birth being about that of a pug-dog. In their young state the whelps may be marked with various markings; brown bands upon a tawny body color and a stripe along the

spine, being most frequently observed. As they grow older, however, the markings disappear, and the uniform tawny hue of the adult is reached. The probable limit of age of the lion has been differently stated by different writers. Buffon fixed it at twenty-two years. But a lion which died in the Tower of London in 1760, had lived in captivity above seventy years. The habits of lions have been observed and described by more writers than in the case, perhaps, of any other animal; and they are known to vary constantly with circumstances, locality and the kind of prey available. In general this heavy animal, which is entirely unable to climb into trees, and frequents open rather than forested regions, gains its food by stealth and power rather than by agility and speed. Lions often go abroad by day, wandering and hunting widely; but are chiefly active at night. Then this great cat goes to some accustomed lurking place near a spring or by the side of a river, where, concealed among the brushwood, he lies in wait for the animals coming to drink. A single powerful leap generally lands him upon his prey which is crushed down by the weight of the attack and mauled and bitten about the head until the neck is broken by a wrench, or the veins and arteries are torn open. If no rivals are near, and the animal is very hungry, the prey may be devoured on the spot to the extent required to satisfy appetite; and then, after drinking copiously, the beast will usually go away to his lair, leaving the remains for his family, if they have come near (as often happens), or to hyenas and jackals. In most cases, however, the lion, like other great cats, chooses to take his quarry to some retired spot where he may feed upon it unobserved; and amazing stories are told, with apparent truth, of the strength displayed in carrying or dragging the carcasses of large antelopes, cattle and horses; it is not to be believed, however, as sometimes has been asserted, that a lion is able to "fling a bullock over its shoulder" and run away with it. Such a feat is limited to goats and small animals, if, indeed, it ever occurs. The lioness hunts by herself, especially when her kittens are young, at which time the father of the family is wandering alone, or with other males, and would be resisted if he attempted to join his spouse. The young remain with the mother until they are full-grown. The lion alone among cats is regularly polygamous, each male having three or four lionesses whose allegiance he gains by prowess in battle over rivals, and keeps by killing or driving off all newcomers. The result of these constant encounters in the arena of the desert is not only a scarcity of males but the continuous selection of the best to become progenitors of the race. One peculiarity of the lion developed by this incessant warfare among the males is the development of the defiant and terrifying voice which elevates the growl, and enlarges the scream, of other cats, into a tremendous roar—a volume of noise beyond that made by any other animal. The statement that the lion roars at stated periods appears to be almost wholly without foundation; in summer alone, and especially before storms, the lion roars before dawn. In rage the lion beats his sides with his tail, agitates his mane and facial muscles, protrudes the tongue and claws, utters the peculiar sharp, frequent growl, and altogether presents a very terrific appearance, all





LION—LIPPE

of which, primarily, has reference to the savage rivalry of males above described.

The natural disposition of all animals to get their food as easily as possible, has led lions everywhere to prey upon domestic cattle which, in a region where they are numerous, suffer nightly despoliation. Lions that have discovered this comparatively easy method of supplying their wants, soon learn that mankind is equally, or even more, readily obtainable, and become "man-eaters." Beasts so sophisticated must be put out of the way; and barbarians organize great bands of men who learn the lair of the animal, surround it and effect the animal's death by any rude means possible. Some savage hunters boldly and skilfully overcome the lion almost in single combat, with rude weapons; and white hunters face him with no greater fear than attaches to encounters with many other large animals; yet the might of the beast makes him an exceedingly formidable foe. The incessant persecution to which the lion is subjected whenever a region begins to become civilized, has exterminated it over a large part of the former domain of the species. When men began to hunt in Europe in the Stone Age, they found there lions, whose remains, entombed in the floors of caves, are called those of "cave lions" (*F. spelæus*), but which present no important differences from the modern species. Within the time of written history lions dwelt in the mountains of southwestern Europe, and many of those seen in Rome in the time of the earlier Cæsars were obtained from the Danube Valley and Asia Minor. The supply was soon exhausted, however, and the later demand was met by importations from the Caucasus and southward, but mainly from northern Africa. In the arenas of ancient Rome, large numbers of lions were frequently exhibited. Sulla, the dictator, once exhibited 100 of these animals, and Pompey presented 600 in the circus; Hadrian caused 100 to be destroyed at one exhibition, and others of the emperors and consuls were equally prodigal. In order to provide these great quantities laws were promulgated protecting the beasts in the Carthaginian provinces, to the great detriment of agriculture there, and risk of the peasantry; and breeding establishments were created to produce enough lions to meet the imperial demand. The taming and training of lions have continued ever since, and to-day this great shaggy cat is the most impressive, if not the most intelligent, of the troupe which the menagerie showman gathers about him. For a long period almost all the lions exhibited in zoological gardens and shows have been those born in captivity, where the species breeds freely.

At the present day, few lions exist north of the Soudan and Abyssinia; and they have become extinct or scarce in the civilized regions of South Africa. They no longer exist in Asia Minor, but are numerous in the extensive marshes along the lower Euphrates and Tigris, and thence occur at intervals to the valleys of the Indus, where a few still remain in the wilder deserts of Cutch and Gujarat. Formerly they were known over all northern and western India.

Books of special value relating to lions and lion hunting are Flower and Lydekker's "Mammals, Living and Extinct"; Blanford's "Zoologies" (of India, Persia and Abyssinia); Ander-

son's "The Lion and the Elephant"; Porter's "Wild Beasts"; and the hunting narratives of Gordon Cumming, Gerard, Harris, Holub, Baker and Selous.

Lion, lē-ōn, or Lyons, Gulf of, a large bay of the Mediterranean on the south of France, extending from the Spanish frontier eastward to the Hyères Islands.

Lipa, lē-pā, Philippines, a pueblo of the province of Batangas, Luzon, situated southwest of Lake Taal, 18 miles north of Batangas city. It is the junction of three important highways, all of which are old military roads, in excellent condition and always passable for heavy wagons. The town is therefore the seat of an important trade; sugar, corn and tobacco are produced, and there are drug stores and fine markets. It is one of the largest towns in the province; the people are very intelligent and progressive, and have established excellent schools; at one time a weekly newspaper was published. Pop. 14,000; municipality, 40,700.

Lipari, lē-pā-rē, or Æolian Islands, a group of volcanic islands in the Mediterranean, about 24 miles from the north coast of Sicily, situated between lat. $38^{\circ} 20'$ and $38^{\circ} 55'$ N.; lon. $14^{\circ} 15'$ and $15^{\circ} 15'$ E.; and comprised in the department of Messina. Pop. about 22,000. These islands called by the ancients Æolie, Vulcania, and Insulae Liparæorum, were supposed to be the residence of Æolus and Vulcan. Lipari, the largest, is populous and well cultivated, producing great quantities of corn and fruit, especially figs, grapes, and raisins; it likewise produces alum, sulphur, nitre, and cinnabar. It is about 15 miles in circumference; the air is healthful, the inhabitants industrious, and the males good sailors. On the eastern coast is situated a town of the same name, containing a castle built by Charles V., a cathedral, a college, several convents, and a hospital. A considerable trade is carried on in the principal produce of the island. The other islands are Stromboli, Panaria, Vulcano, Salini, Alicudi, and Felicudi, with two or three smaller ones. Volcanic eruptions ceased in the 6th century; but Lipari is composed of pumice-stone, lava, volcanic glass, and black sand; and the warm baths and heated vapors of the stoves (excavations which emit hot sulphurous exhalations) prove the activity of the subterranean fires.

Li"rogrammatic Compositions, are those in which certain letters are purposely omitted. Lope de Vega wrote a novel without an *l* or an *a*. Kotzebue wrote one without *r*.

Lipoma. See TUMORS.

Lip'ard, George, American novelist: b. Yellow Springs, Pa., 10 April 1822; d. Philadelphia 9 Feb. 1854. His most noted work was "The Quaker City" (1845), modeled on Sue's "Mysteries of Paris," and implying that Philadelphia was a modern Sodom, though he disclaimed the inference when threatened with legal consequences. Other works by him were "Mysteries and Miseries of Philadelphia"; "The Empire City: New York—Its Upper Ten and Lower Million"; "Paul Ardenheim," a Rosicrucian romance; "Legends of Mexico"; "Legends of the Revolution" (1847); "Washington and his Generals."

Lippe, lē-pē, or Lippe-Detmold, Germany, a principality, bounded north, west, and

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south by Rhenish Prussia, and east by Hanover, Schaumburg-Lippe, and Hesse-Nassau; area, 438 square miles. It lies on the Teutoburger Wald, and is covered almost throughout by mountains and well-wooded hills, drained by the Werra, Bega, Exter, Ems, and by the Lippe. The climate is mild, but humid. Some parts of the surface are waste, or fit only for pasture, on which considerable numbers of cattle are reared; but others are fertile, producing corn, rape, hemp, and flax. The principal metal is iron, and there are quarries of limestone and gypsum, and valuable saline springs. Weaving is the chief industry, though there are also glass-works, several paper and numerous saw mills. The principal exports are wood, thread, linen, and wool. For administrative purposes it is divided into twelve bailiwicks, of which Detmold is the capital. The other chief towns are Lemgo and Horn. Since 1836 the government has been constitutional; it is a member of the German empire, and sends one member to the Bundesrath, and one to the Reichstag. Pop. chiefly Protestants (1900), 139,238.

Lippi, Fra Filippo del Carmine, frà fē-lép'pō dél kär-mē'nā lēp'pē, Italian painter: b. Florence 1406; d. Spoleto 9 Oct. 1460. In his 15th year he entered the Carmelite monastery at Florence and early formed his style on the example of Masaccio, but was later influenced by Masolino, and Angelico of Fiesole (Fra Giovanni). In 1432 he left his convent, but without release from his vows. His relations with Lucrezia Buti, whether a nun or not, are largely unverified romances of Vasari, and modern biographers are not inclined to believe them. In his best work he united with the spiritual feeling of Fra Angelico of Fiesole, the strong historic imagination, energetic modeling, and unconventional loveliness of form and face, characteristic of Masaccio. His greatest masterpiece is in the parish church of Prato, and consists of a series of frescoes illustrating the life of St. Stephen, John the Baptist, etc. Many of his altar-pieces are now in the Florentine Academy. His last frescoes in the Cathedral at Spoleto were executed with the collaboration of Fra Diamante. Examples of this painter are also to be found in the galleries of Berlin, Munich, and Rome.

Lippi, Filippino, fē-lē-pē'nō, son of the preceding by Lucrezia Buti, Italian painter: b. Prato 1457 or 1458; d. Florence 18 April 1504. He was a pupil of Fra Diamante, but seems to have closely followed the artistic example of his father and Sandro Botticelli. Among his wall paintings, which show a wonderful advance beyond his predecessors, are those in the chapel of the Brancacci family at Florence, in which is portrayed the history of SS. Peter and Paul, and the decoration of the walls of the Church of Santa Maria Sopra Minerva, at Rome (1489) illustrating the life of Saint Thomas Aquinas. His masterpiece, however, is to be found at Florence in the Strozzi chapel of Santa Maria Novella, where his frescoes portray the legendary life of the Apostles Philip and John (1502). Some of his smaller canvases are in the galleries of Florence, Bologna, Berlin and Copenhagen.

Lippi, Lorenzo, lō-rēnd'zō, Italian poet and painter: b. Florence 1616; d. there 1664. He published a comic epic poem in 12 cantos,

'Il Malmantile vacquisdato' under the anagrammatic pseudonym, "Perloni Zipoli" (1676). The poem abounds in rare humor and is written in light, swift verse. The language, however, abounds in Florentine provincialities, and is unintelligible without such a commentary as is furnished to the edition of 1688 by P. Munucci. As a painter he was an imitator of Santi di Tito's manner. There is a 'Crucifixion' of his in the Uffizi gallery at Florence; and 'The Triumph of David'; and 'Christ and the Woman of Samaria' are in the Imperial gallery at Vienna.

Lippincott, lip'in-kōt, Joshua Ballinger, American publisher: b. Juliustown, N. J., 1816; d. Philadelphia 5 Jan. 1886. He was a bookseller in Philadelphia 1831-6 and in the last named year founded the house of J. B. Lippincott & Co., which by 1850 was at the head of the book trade in Philadelphia. After his death, in 1886, the firm was converted into the J. B. Lippincott Company. 'Lippincott's Magazine' was established in 1868.

Lippincott, Sara Jane Clarke, "GRACE GREENWOOD," American writer: b. Pompey, N. Y., 23 Sept. 1823; d. New Rochelle, N. Y., 20 April 1904. She was married in 1853 to L. K. Lippincott of Philadelphia. She first became known as writer for young people over the signature "Grace Greenwood." She edited for many years 'The Little Pilgrim,' a paper for juvenile readers, lectured on anti-slavery and other reform movements, and corresponded for various New York journals. She published 'Greenwood Leaves' (1850); 'Poems' (1851); 'Merrie England' (1855); 'Records of Five Years' (1868); and 'New Life in New Lands' (1873); 'Victoria, Queen of England'; 'Recollections of My Childhood'; etc.

Lippincott, William Henry, American artist: b. Philadelphia, Pa., 6 Dec. 1849. He began his art studies in the Pennsylvania Academy of Fine Arts, and his first professional appearance was as a book illustrator and later as a scene painter. In 1874 he became the pupil of Bonnat and for the eight years he remained at Paris exhibited annually in the Salon. The wide range of the work which he has done since he took up his residence in New York includes portrait, genre, landscape and scene painting, and he appears regularly as an exhibitor in the annual American art exhibitions. His most important pictures include 'The Duck's Breakfast'; 'Un Jour de Congé'; 'Pink of Old Fashion'; 'Helena'; 'Infantry in Arms'; 'Love's Ambush'; and 'Pleasant Reflections.'

Lip'pitt, Charles Warren, American manufacturer and politician: b. Providence, R. I., 8 Oct. 1846. He was graduated from Brown University in 1865 and in 1869 entered his father's woollen establishment. He has held various local posts of honor, such as president of the Providence Board of Trade, 1881-2, and has been president since 1896 of the Rhode Island National Bank. He was governor of Rhode Island, 1895-7.

Lippmann, lip'man, Julie Mathilde, American author and critic: b. Brooklyn 27 June 1864. She received an academic education and began writing at an early age. She has contributed to the leading American magazines; and has written verse and juvenile stories. Her publications include 'Through Slumbertown,

LIPTON—LIQUOR TRAFFIC

and Wakefield' (1891); 'Jock o'Dreams' (1891); 'Miss Wildfire' (1897); 'Dorothy Day' (1898); 'Sweet Ps' (1902); 'Dearie, Dot, and the Dog' (1903); 'Del's Debt' (1903); also the plays 'A Fool and his Money' (1897); 'Cousin Faithful' (1897); and 'The Facts in the Case' (1897).

Lip'ton, Sir Thomas Johnstone, Irish merchant and yachtsman: b. Glasgow, Scotland, 1850. He came to America as a steerage passenger in 1865, for two years worked in the South Carolina rice fields, later in various northern towns, opened a provision shop in Glasgow, attained great business success and finally organized the "Lipton, Limited," the largest commercial establishment in the United Kingdom, where it controls 420 shops. This business is capitalized at \$200,000,000, with tea, coffee, and cocoa estates in India and Ceylon, fruit-orchards in Kent and elsewhere, and a packing-house and refrigerator-car line in Chicago. Lipton has given largely for charitable purposes, including \$125,000 in Diamond Jubilee year (1897) for a dinner fund for the poor, and \$500,000 toward the Alexandra trust for supplying working-people with cheap dinners. He is best known, however, for his efforts as a representative of the Royal Ulster Yacht Club to obtain the America's Cup in the international yacht-races of 1899, 1901, and 1903. His three British-built yachts were in each contest defeated in three straight races, by the Columbia in 1899 and 1901, and by the Reliance in 1903. He was knighted in 1893, and made a baronet in 1902.

Liquefaction of Gases. See **GASES, LIQUEFIED, USE OF.**

Liqueur, li-kér' (the French name), a palatable spirituous drink composed of water, alcohol, sugar, and some aromatic infusion extracted from fruits, seeds, etc. The great differences in the qualities of the different liqueurs are owing principally to a variation in the proportions of the sugar and alcohol. The French distinguish three qualities: the first are the *ratafias* or simple liqueurs, in which the sugar, the alcohol, and the aromatic substance are in small quantities: such are the anise-water *noyau*, the apricot, cherry, etc., ratafias. The second are the oils, or the fine liqueurs, with more saccharine and spirituous matter, as the *anisette*, *curacao*, etc. The third are the creams or superfine liqueurs, such as *rosoglio*, *maraschino*, Danzig water, etc. The same aromatic infusion may therefore give its name to liqueurs of different qualities, in which the materials are the same but the proportions different.

Liquid Air. See **AIR; GASES, LIQUEFIED, USE OF; TRIPLER, C. E.**

Liquidambar, lik'wid-äm"bar, Sweet, Red, or Star-leaved Gum, a tree (*Liquidambar styraciflua*), also called bilsted and alligator-tree, of the witch hazel family widely diffused through North America, from lat. 43° to Florida, and along the shores of the Gulf into the provinces of Mexico. The leaves are five-lobed, and the lobes are pointed, and serrated on the margin, giving them a very distinct and elegant form, and in autumn they turn rich purplish red. The flowers are inconspicuous. The fruit consists of a hanging ball of woody pointed pods which open and release the seeds,—a most singular and characteristic fruit, suggesting the globular spiked head of the mediæval war-club called

"morning star." The usual diameter of the trunk is from 1 to 3 feet. The wood is compact, capable of receiving a fine polish, and has been used for articles of furniture. The bark has a habit of forming wing-like projections on the twigs, unlike any other American tree, on being wounded yields a small quantity of a fragrant resin (storax or styrax), which contains benzoic acid. Most of the liquid storax used in pharmacy, however, is obtained from Trieste, and is collected from *L. orientale*, the "lord-wood" of the Cypriots, which grows throughout the Levant.

Liquids, Compressibility of. It was long supposed that liquids were perfectly incompressible. In the Florentine experiment a hollow globe of gold or lead was filled with water and the hole soldered. When the globe was crushed, so that its volume was diminished, some water forced its way through the metal and appeared like dew on the outside, and it was hence concluded that water was not susceptible of compression. Oersted, however, disproved these conclusions. His piezometer, which was a bulb at the end of a graduated capillary tube, was nearly filled with water, a small thread of mercury being at the end of the column of water in the tube. The relative volumes of the bulb and tube were known. The piezometer, along with a small air manometer, was surrounded with water inside a strong glass vessel. The water filled the vessel, and might be subjected to great pressure by means of a screw. When the screw was turned, the position of the mercury thread showed the water in the piezometer to be compressed; and comparison with the manometer enabled the compressibility to be found. Oersted's method is not exact enough. The following results are those of Grassi, who employed Ragnault's improvement on Oersted's method. The pressure of one atmosphere caused

Mercury at 0° C.	to shrink 3 millionths of its volume.
Water at 0° C.	50 "
Water at 41.6° C.	44 "
Ether at 0° C.	111 "

Liquor Laws and License. See **INTERNAL REVENUE; LOCAL OPTION.**

Liquor Traffic. The use of alcoholic beverages in the United States has increased 100 per cent since 1880. In 1902, the consumption of liquor amounted to 19.48 gallons per capita. The use of the milder stimulants has not grown so fast, that of coffee rising from 8.78 pounds per capita to 13.37 pounds, a little over 52 per cent, while tea dropped from 1.39 pounds to 0.94 pound, a decrease of nearly 48 per cent. The supplanting of the milder for the stronger stimulants does not indicate greater national regard for better social and higher physical conditions.

The total bill of the American people for stimulants in 1902 was \$1,396,008,276; the average yearly expenditure for the previous five years, \$1,239,108,955. The record for 1902 represents a per capita expenditure for stimulants of \$17.33 for the 79,003,000 inhabitants of the United States, or 4.7 cents per day. The users of alcoholic stimulants are estimated to form one fourth the total population, on which basis the per capita cost of alcoholic beverages is \$69.32, or 19 cents per day.

Bringing together into one group the cost at retail of all beverages, we find that the United States consumed in 1902 alcoholic and non-

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alcoholic stimulants to the value of \$1,369,098, 276, as follows:

Alcoholic drinks	\$1,172,565,235
Non-alcoholic stimulants —	
Coffee	\$149,891,030
Tea	39,642,011
Cocoa	7,000,000
	196,533,041
Total, 1902	\$1,369,098,276
Total, 1901	1,273,212,386
Total, 1900	1,228,674,925
Total, 1899	1,146,897,822
Total, 1898	1,177,061,366

The quantities of the four leading beverages consumed for the year ending 30 June 1902, were as follows:

	Gallons
Coffee	1,498,910,304
Beer	1,381,875,437
Tea	396,420,115
Spirits and wines	157,206,554

The latest report of the United States Bureau of Statistics shows the per capita consumption of liquors in this country:

	Spirits Gallons	Wine Gallons	Beer Gallons	Total Gallons
1892	1.51	.44	15.17	17.12
1893	1.52	.48	16.20	18.20
1894	1.34	.31	15.32	16.97
1895	1.13	.28	15.13	16.54
1896	1.01	.26	15.38	16.66
1897	1.02	.53	14.94	16.50
1898	1.12	.28	15.96	17.36
1899	1.17	.35	15.28	16.80
1900	1.27	.40	16.01	17.68
1901	1.33	.37	16.20	17.90
1902	1.36	.63	17.49	19.48

Coffee continues to hold first place in the affections of the American people. Its low cost stimulates demand and makes it a formidable competitor of alcoholic liquors and malt beverages. The use of beer, wine and spirits shows considerable gain over 1901 — a notable fact in view of the great prosperity of the United States. See BEER; COFFEE; TEA; WHISKEY; WINE; ETC.

Liquorice. See LICORICE.

Liquors, a term applied to alcoholic or spirituous fluids whether distilled or fermented. Alcoholic liquors are usually divided into three groups, viz., the fermented, the malt liquors, and the distilled liquors. The first of these include those wines and liquors which are made from the juice of fruits and in which the natural sugar is converted into alcohol by exposure to the open air. The second class includes such as ales, porter and beer in which the starchy ingredients are by certain processes changed into sugar before fermentation can take place. The third division includes brandies, whiskies and gin, and whether these be derived from fruits or grain the distillation process is carried on further by condensation and vaporization.

Wine Manufacture.— Wine needing no machinery for its manufacture is the oldest of beverages. It was early made by the Greeks and Romans who exercised the greatest care in its preparation, often flavoring it with spices and herbs. The early settlers of this country naturally set about its manufacture almost simultaneously with their landing, but it was not until about 1880 that the wine industry received any impetus, and since that time it has rapidly

increased. The California wine industry which is little more than fifty years old gives employment to 60,000 persons and represents a combined capital of \$72,000,000. The largest vineyard in California and also the largest in the world was owned by the late Senator Leland, founder of the Leland Stanford Junior University. It comprised nearly 5,000 acres.

Manufacture of Malt Liquors.— The consumption and manufacture of malt liquors in America increased very slowly principally on account of the introduction of tea and the household manufacture of ciders and fruit brandies. The manufacture of beer in the United States began about 1840, and the number of breweries for making of malt liquors has increased from 431 in 1850, to about 1600 in 1903. The development of this branch is due chiefly to the energy of the Germans. The chief cities for its manufacture are Milwaukee, St. Louis, Cincinnati, Rochester, Pittsburgh and Kansas City.

Manufacture of Distilled Liquors.— The steady growth of this industry is not so marked as that of wine and malt liquor manufacture.

The distilleries are scattered about 28 different States, among which Illinois produces the largest amount, with Kentucky, Indiana, Ohio, Pennsylvania and Maryland following in order named. For statistical information see U. S. government reports 1903.

Lira, lē'rā, an Italian silver coin valued at about 18 cents in American money. It is the basis of the Italian monetary system; the gold coins are pieces of 100, 50, 20, 10, and 5 lire; the silver coins, of 5 and 2 lire, besides 1 lira and a half lira (50 centesimi); also lower coins in nickel and bronze.

Lir'ioden'dron. See TULIP TREE.

Lisaine, lē-zān, Battle of, an engagement of the Franco-German war, 15-17 Jan. 1871, on the banks of the Lisaine River near Belfort (q.v.). See BOURBAKI CHARLES DENIS SAUTER.

Lisbon, liz'bōn, Ohio, village, county-seat of Columbiana County; on the Beaver River, and on the Erie Railroad; about 130 miles northeast of Columbus. It is situated in an agricultural region with extensive coal-fields in the vicinity. Sheep and cattle raising, the cultivation of grain and vegetables, and mining are the prominent occupations in this section. Lisbon is the trade centre for a large portion of the county. The village owns and operates the waterworks. The public library has about 4,000 volumes. Pop. (1890) 2,278; (1900) 3,330.

Lisbon, Portugal, the capital and principal seaport on the right bank of the Tagus, about 9 miles above its mouth. It is built on a succession of hills, rising from the quays in the form of an amphitheatre. The streets of the older parts, more especially in the east, are steep, narrow, crooked, badly paved, and dirty; the houses, with a few exceptions are old-fashioned and mean. The modern portion, however, which lies on even ground, in the valley between the Monte do Castello on the east, and the hills of San Francisco and Do Carmo on the west, consists of several parallel streets crossed by others at right angles, and is regular, well built, clean, traversed by street railways, electrically lighted, and provided with a telephone service. Of these the D'Ouro (Gold), Do Prato (Silver), D'Augusta, Do Chiado (Cloth) streets extend about one half mile, north to south, hav-

LISBURN — LISZT

ing at their southern extremity the Praça do Comercio, a large and handsome square, surrounded on three sides by the naval arsenal, the exchange, custom-house, and other public buildings, and having the Tagus on the south. At the northern extremity of these streets are the Praça da Figueira, a picturesque square, used as a public market, and a handsome square called the Rocio or Praça de Dom Pedro IV., with a fine bronze statue of Dom Pedro IV., surmounting a tall marble column. To the northwest extends, for nearly a mile, a broad avenue, the Avenida da Liberdade, lined with handsome houses, and planted with shrubs, etc. Besides this the finest open spaces are the Estrella Gardens, the Botanic Garden, the Praça do Príncipe Real and that of Pedro de Alcantara. The western quarter called Buenos Ayres, is airy and pleasant, and here foreigners chiefly reside. The town of Belém, on the west, beyond the river Alcantara, forms a sort of suburb to Lisbon. It has a well-known tower, forming one of the defenses of the harbor. The principal residence of royalty is the Ajuda Palace, built of white marble on the summit of a hill. The castle of St. George is remarkable for the beauty of its situation. Other noteworthy buildings are the cathedral, once a Moorish mosque, on the slope of the Castle Hill, on the east; the church do Coração de Jesus, surmounted by a splendid dome; the church of the Martyrs, erected on the spot where Alfonso I. mounted the walls of the city and rescued it from the Moors; the handsome church of Santa Engracia; the church and monastery of Belém; and the church of San Roque. The numerous convents which crown the hills, and appear like palaces and fortresses, are for the most part massive and imposing structures. But unquestionably the most remarkable specimen of architecture is the aqueduct which conveys water to the city from springs rising near the village of Bellas, about 6 miles distant. It is partly conducted underground, but on approaching Lisbon it crosses the deep valley of Alcantara, which is spanned for nearly 2,500 feet by a bridge of thirty arches, the loftiest of which is 240 feet high and 110 feet wide. An additional supply is brought in by another series of works from a distance of 18 miles. The scientific and literary institutions comprise the Royal Academy of Sciences, founded in the latter part of the 18th century; the well equipped Polytechnic School, with a museum, botanic garden, and observatory; an academy of medicine and surgery; institute of agriculture and veterinary medicine; Royal Marine Academy; Royal Military College, School of Music, National Library, containing about 300,000 volumes, and that of the Academy of Sciences, numbering about 80,000 volumes; the Royal Schools of Vicente de Fora; Royal School of Drawing and Architecture. The harbor, or rather the roadstead, is one of the finest in the world; and the quays, which extend between two and three miles along the bank of the river, are elegant and commodious. The exports consist chiefly of wine, oil, fruit, cork, fish, onions and other vegetables, and salt; and the principal imports are grain, silk, linen, cotton, and woolen cloths, iron, steel, hardware, dried fish, petroleum, colonial produce and coals. An aggregate of about 6,000 vessels of over 7,000,000 tons enter and clear the port annually. The manufactures include various textile goods, tobacco, paper,

chemicals, and soap; there are also sugar-refineries, iron-foundries, and potteries.

Lisbon was anciently called Olisipo. Felicitas Julia was its name under the Romans. It was captured by the Moors in 716, and remained in their possession till 1147. In 1755 it was visited by the historic and terrible earthquake, which threw down a considerable portion of the city, and destroyed above 30,000 of its inhabitants. It was taken by the French in 1807, but resisted an attack by Masséna in 1809. Pop. (1900) 357,000.

Lisburn, lis'bērn, Ireland, a market-town in the counties of Antrim and Down, 8 miles southwest of Belfast, on the river Lagan. It is in general well built, and has a clean and thriving appearance with a market-house and court-house; the episcopal cathedral church of the united dioceses of Down, Connor, and Dromore, containing a monument to Jeremy Taylor, who died here in 1667; a Roman Catholic church and other places of worship; county infirmary; new people's park, etc. Flax spinning and weaving, and the manufacture of thread, muslin and damask, employ the greater number of inhabitants. Pop. (1901) 11,459.

Lissajous's (lē-sā-zhoōz') Figures. A ray of light is reflected from the limb of an upright tuning-fork to the limb of a horizontal tuning-fork, and thence to a screen, a point of which it illuminates. When the tuning-forks vibrate, if they are perfectly in unison the spot on the screen describes a straight line, or a circle, or an ellipse, but if not, various complex curves are described. See Acoustics; VIBRATION.

Lis'ter, Joseph, English surgeon: b. Upton, Essex, 5 April 1827. He was graduated M. B. of London University in 1852, becoming in the same year a fellow of the Royal College of Surgeons. For a few years he lectured on surgery in Edinburgh, and from 1860 to 1869 was professor of surgery in Glasgow University. He was professor of clinical surgery in the University of Edinburgh, 1869-77, and filled the corresponding chair in King's College, London, 1877-92. His name is especially connected with the successful application of the antiseptic treatment in surgery, which inaugurated a new era in this branch of medical science. He received the prize of the Academy of Paris, and the medal of the Royal Society in 1880. In 1883 he was made a baronet, and in 1897 was raised to the peerage. He has published papers on surgical pathology, etc.

Liszt, Franz, frānts list, French pianist and composer: b. Raiding, near Odenburg, Hungary, 22 Oct. 1811; d. Bayreuth 31 July 1886. He was scarcely nine years of age when he made his first appearance as a pianist and improvisator in Odenburg and Presburg with such success, that several noblemen undertook the expenses of his training at Vienna under Czerny the pianist, and Salieri the composer. In 1823 he made a great sensation as executant and improvisator on the piano in Vienna, Munich, Paris and other cities. His father thereupon traveled with him through France, Switzerland and England for further study of his art. While yet a boy he composed the operetta 'Don Sancho' (1824) and the following year launched out into grand opera at Paris. His hearing of Paganini in 1831 affected him greatly and had a most stimulating influence on his

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cultivation of virtuosity. At this time he experienced the conflict, between his religious pre-dilections and his father's wishes for his musical success, which resulted in his yielding to the latter's advice and adopting the profession of music instead of studying for the ministry. In 1835 he had completed his studies as composer for the piano, and in company with the Countess d'Agoult, who afterward became the mother of his children, he began his travels, during which he gave a series of concerts in Switzerland, Italy, and Hungary, winding up with some remarkable performances in Vienna. From 1839 to 1847 he made a triumphal progress through the whole of Europe. His success was due less to the astounding power of execution with which he rendered the masterpieces of every age, than to the sublimity, the noble feeling, the depth of expression with which he rendered every number of his programme. Honors now were showered upon him; he was made Kapellmeister to the Grand Elector of Weimar; Frederick William IV. knighted him, and he was decorated by every court in Europe. From this time (1848) to 1861 he worked at Weimar as the teacher and "inspirer" of a large circle of young musicians. He then settled in Rome. In 1870 he was made president of the Royal Musical Academy at Budapest and henceforth lived in turn there, at Rome and at Weimar. The villa in the last city which he occupied now contains the Liszt museum.

In the career of Liszt as a composer there are three distinct periods. The compositions of his first period consist partly of "Transcriptions" for the pianoforte (a department in piano music inaugurated by him); partly of piano pieces, songs and choruses for male voices. In the second period, during his residence at Weimar, he applied himself to purely instrumental music, in accordance with the principles which he had learned of Berlioz. He sought on the piano to express by a symphony familiar poetic objects and by means of this to adumbrate ideas of a lyric or dramatic order. To this class of compositions belong his twelve "Symphonic Poems," namely, (1) "Ce qu'on entend sur la Montagne" known also as "The Mountain Symphony"; (2) Tasso's "Lamento e Trionfo"; (3) Preludes, after Lamartine's "Notre Vie est-elle autre Chose qu'une Serie de Preludes"; (4) "Orpheus"; (5) "Prometheus"; etc. Later in this period appeared "Missa Solemnis" and "The Hungarian Coronation Mass." In his third period, from his residence in Rome to his death, he is chiefly remarkable as a composer of sacred music. He produced the oratorios "Christus"; and "The Legend of Saint Elizabeth"; a "Requiem," for male voices and the organ; besides "Cantatas," "Psalms," "Paternosters," and short pieces for the church choir. In all these works he followed the method inaugurated by Berlioz and Wagner, and his works indicate the high water mark of the North German school. What perhaps won him most renown were his "Symphonic Poems" and his sacred compositions, in which latter he strove to blend the liturgical and dramatic elements of music. He was also a musical critic of considerable power. Among his published works may be enumerated: "Frederic Chopin" (1852); "Lohengrin et Tannhäuser de R. Wagner" (1851); and "Les Bohémiens et leur musique en Hongrie" (1859). Consult: Ramann, "Franz Liszt als Künstler und

Mensch" (1893); Voegel, "Franz Liszt" (1888); Von Lenz, "Great Piano Virtuosos" (1899); and Fay, "Music Study in Germany" (1880).

Lit de Justice, lē dé zhüs-tēs, formerly a solemn proceeding in France, in which the king, with the princes of the blood royal, the peers, and the officers of the crown, state, and court, proceeded to the parliament, and there, sitting upon the throne or lit, caused those commands and orders which the parliament did not approve to be registered in his presence. The parliament had the right of remonstrating in behalf of the nation against the royal commands and edicts. Louis XV. held such a lit de justice in 1763, in order to introduce certain imposts, but on account of the firm resistance of the parliaments he was finally obliged to yield. The last lits de justice were held by Louis XVI. in 1787 and 1788.

Litany (from the Greek *litaneia*, supplication, prayer), a form of prayer or song, first especially used on occasions of public calamity, and introduced according to Zonaras and Nicephorus, by Proclus, about the year 446, at Constantinople, in the reign of Theodosius; according to Paulus Diaconus, under Justinian, at Antioch, in consequence of the following circumstance: An earthquake, says the legend, having driven the people into the fields, a boy was suddenly taken up into the air in their presence, but was again let down unhurt, on the people crying out "Kyrie eleison!" (O Lord, have mercy). The boy related he had heard the song of the angels, "Holy God! Holy and Mighty, Holy and Immortal! have mercy upon us!" and this gave rise to the Litany. This kind of common prayer was perhaps not unusual among the Jews, and Psalm cxxxvi. seems to have been adapted to this purpose.

The litanies in general use in the Roman Catholic Church are the "Litany of the Most Holy Name of Jesus," the "Litany of the Saints" and the "Litany of Loreto." The "Litany of the Most Holy Name of Jesus" is composed of a series of addresses to Jesus Christ, using the different names by which He is called. Like all the litanies it begins with "Kyrie eleison" (Lord have mercy) and ends with an entreaty to the "Lamb of God who taketh away the sins of the world." This litany is said aloud in the churches by the members of the "Holy Name Societies" on general communion days. The "Litany of the Saints" is composed of supplications to God for favors and to return thanks, and a number of petitions to saints asking their intercession. This litany is a part of the special church service for Saint Mark's day, the rogation days, the rubrics for the consecration of churches and cemeteries, for ordinations and for other church services. The "Litany of Loreto" receives its name from being sung on Saturdays and feasts of the Virgin Mary, in the Santa Casa of Loreto. It consists of a number of petitions to the Virgin Mary using her different titles as found in the Scriptures and in sacred writings, and asking her intercession.

Litanies are found in the old hymn-books of the Lutherans, but are no longer used by Protestant Germans. In the Anglican prayer-book the litany is retained, and though it adheres in many respects to the ancient forms, it differs from that of the Roman Catholic Church, and contains no

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invocation of the Virgin or the saints. Since 1661 it is no longer a distinct service, but, when used, forms part of the morning prayer, after the third collect for Grace.

Litchfield, lich'fēld, Grace Denio, American novelist: b. New York 19 Nov. 1849. She has lived in Europe for a number of years, but since 1888 has resided in Washington, D. C. Her works are: 'Only an Incident' (1883); 'The Knight of the Black Forest' (1885); 'Criss Cross' (1885); 'A Hard-Won Victory' (1888); 'Little Venice' (1890); 'Little He and She' (1893); 'Mimosa Leaves' (1895); 'In the Crucible' (1897); 'The Moving Finger Writes' (1903).

Litchfield, Conn., borough, one of the county-seats of Litchfield County; near Bantam Lake, and on the Shepaug, Litchfield & Northern railroad; about 15 miles northwest of Waterbury and 28 miles west of Hartford. The first settlement was made in 1719, and the place was called Bantam, but after a few years the name was changed to Litchfield. During the Revolutionary War the place was used for storage of supplies. The women of Litchfield melted and made into bullets the statue of George III. which the people of New York city had torn down from Bowling Green on 9 July. Sarah Pierce opened here, in 1792, a school for the higher education of women. Judge Topping Reeve, in 1784, opened here the first law school in the United States. It was patronized by many young men who afterward became prominent in the affairs of the nation. It was the birthplace of Ethan Allen and of Henry Ward Beecher and Harriet Beecher Stowe. Lyman Beecher was a pastor here for 16 years beginning with 1810. Litchfield is situated in a region where grazing and dairying are the prominent industries, but valuable deposits of nickel ore are found in the vicinity. The beautiful scenery, beautiful and mild climate, make it a favorite pleasure resort. The chief industrial establishments are nickel-smelting works and creameries. Bantam Lake, nearby, is the largest in the State. Pop. (1900) 1,120.

Litchfield, Ill., city, in Montgomery County; on the Illinois Central, the Cleveland, C. & St. L., the Wabash, the Chicago, P. & St. L., the Chicago & A., and the Jacksonville & St. L.; about 50 miles northeast of Saint Louis, Mo., and 45 miles south of Springfield. It is in a good farming section, with oil, coal, and natural gas in the vicinity. The chief industries are mining and manufacturing. The principal manufactures are railroad cars, foundry products, glass, briquet ornaments, mine engines, brick, tile, flour, and lumber. The trade is in the manufactures, coal, oil, and some farm products. It has good schools, a public library, and several prominent buildings. The government is vested in a mayor whose term of office is two years, and in a council, with administrative officials appointed by the mayor and approved by the council. Pop. (1900) 5,918.

Litchfield, Minn., village, county-seat of Meeker County; on the Great Northern railroad; about 63 miles west of Saint Paul. It is situated in an agricultural and stock-raising region. Its chief industries are connected with farm products and the shipping of live stock. It has machine-shops, flour and lumber-mills,

wagon and carriage factory, a foundry and brick yards. Pop. (1900) 2,280.

Litchi, lich'i, or Lee-Chee, a tree (*Nephelium litchi*) of the horse-chestnut family, native to southern China. It is of moderate size, with brown bark, large leaves, and fruit produced in bunches, which are pendant from the extremities of the twigs. Each berry, known in trade simply as "litchi," is 1 to 2 inches in diameter, with a tough, thin, leathery coat, and a colorless half-transparent pulp, in the centre of which is a single brown seed. The fresh fruit is pleasantly sweet and reputed to be one of the most delicious known. It is sold extensively in America and Europe in a dried state, and though the pulp is much diminished in size it retains a considerable portion of its original flavor. Attempts have been made to cultivate it in the United States with some success in southern California and at Key West, but the tree seems extremely susceptible to chilling. Other species of *Nephelium*, as the longan tree (*N. longanum*) of the East Indies, yield similar fruit, and seem better adapted to American cultivation; its nuts are smaller and less sugary than those of the litchi, but are regarded by the Chinese, by whom they are also cultivated, as having useful medicinal qualities.

Liter. See **LITRE**.

Literary History, the history of books, treating therefore the attainments and progress of the human mind in every department, and the characteristic tendencies and opinions of every age. Political and ecclesiastical histories deal chiefly with events; literary history, with thought; each merges into the other, and they are necessarily connected in any complete narrative. Bibliography, biography, and even special criticism are but the subordinate parts of literary history; its main object is to show the general progress and phases of intellectual development and of æsthetic and moral culture. The ancients left no example of this species of history. It consists in large part of generalizations from literary phenomena, of which Paterculus gives one early instance. He shows by a historical review that the great men of antiquity seem often to have come in clusters, appearing almost contemporaneously in particular places. Quintilian also introduces the principal authors of Greece and Rome together in a single chapter. But the classical and mediæval authors rendered scarcely any service to this department, except by leaving materials. The principal attempts in the 17th century were the 'Prodromus Historiæ Literariæ' of Lambecius (1659), in which the design of a universal account of literature is completed only as far as the times of Moses and Cadmus, and the 'Polyhistor Literarius' of Morhof (1688), a work of erudition and judgment, which was enlarged by Fabricius, and remained long in esteem. From the 16th century many more or less comprehensive histories of European literature have appeared, and the 19th century especially produced valuable synoptical views both of European and Oriental literature.

Literary Labor-savers, Library Utensils, and Mercantile Office-fixtures. Man goes from barbarism to civilization by learning to do things better, quicker, easier, or more cheaply. Some labor-savers combine two or

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more of these improvements. America leads the world in prosperity because it led in adopting standard sizes for parts of machinery and in other labor-saving methods and devices. Obviously by as much as services of high salaried men who work at desks are more valuable than those of mechanics, by so much are literary labor-savers worth more to the world than the highly prized machines of manufacture and commerce. Yet it was not till a library supply bureau was founded in Boston in 1876 that this was practically recognized. Since then there has been marvelous development, till now a device for saving money, time or labor in office, library or study is valued as highly as one for factory, shop or farm.

This article aims to be practical, not historical, and to call attention to a few less prominent things useful to those aiming to accomplish most intellectual labor with their time and strength. Space allows only dogmatic statements when convincing reasons based on long tests and special studies could easily be given. These experiments are constantly in progress in connection with the New York State Library School, at Albany (see LIBRARY SCHOOLS), which has in its museum of labor-saving methods and appliances the entire collections and World's Fair exhibits of the American Library Association organized in 1876, the aim being to give information as to which of the countless devices and new methods are really worth adoption.

Hundreds of ingenious, practical labor-savers for technical uses will be brought to attention of those needing them by their promoters. Electric and other tabulating and computing machines illustrate immense savings made possible by such devices, which are as important to desk workers as sewing-machines to seamstresses or improved tools to mechanics. If the principle is admitted that time and labor should be saved for brain work as for hand work, it follows that the minutest saving is worth attention. Many factories make their entire profit by using an improved method or machine, or by utilizing waste in some by-product. In offices with many clerks, a method by which four motions do the thing formerly taking five, saves a considerable aggregate in salaries each year.

Writing and Printing.—Writing is easily the greatest of human inventions. All nations recognize this in their traditions by attributing to it divine origin. Some 5,000 years ago Egyptian priests evolved pictures of things into ideograms or pictures of abstract qualities and ideas, then pictures for sounds of words or syllables (where some Eastern languages still stop); and finally pictures for sounds of final elements or single letters. The surfaces on which these were written were evolved from stone, horn, clay, metal, wood, wax, bamboo, and birch-bark, skins, and papyrus, till we reached that wonderful product, paper. The first writing implement, of flint, was followed by the stylus, fine brush of hairs, split reed, quill, steel and gold dip pens, which in turn are now being superseded by fountain pens and typewriters. After inventing writing, the ancients devised abbreviation systems as labor-savers. Then came the faster forms of letters for cursive writing which we call small or lower case. Taking less space and being both written and read more quickly, they

have already largely displaced capitals, with a growing tendency to displace them still farther. The next step was a combination of greater abbreviation and greater simplifying of forms by stenography, which was revolutionized and systemized by Isaac Pitman. (See STENOGRAPHY.) The greatest invention after writing was printing, followed by telegraph, cable, and telephone, which, in universal use, suggest what the human mind has already done and possibilities of further growth.

Model Office or Study.—A southeast corner room is best; north light is most uniform; west least desirable. Health forbids carpets in public rooms. Use hardwood floors, or corticine, which is cheap, durable, easily washed, deadens noise, and is warm. Hot water is best for heat, being free from the quick changes and annoying cracking usual in steam. For ventilation, have both inlet and outlet flues, with open fire if practicable. If not, insure circulation through flues by gas jets, pipes, or motors. Desks should stand with windows at left. The popular roll-top darkens the desk top. The roll, if needed, is better over pigeonholes, which are best for space in front of the chair if one has many papers, as they allow the largest number of boxes to be reached most quickly. Pigeonholes are best where quick work is the chief end, but catch more dust than drawers and take more space than vertical files which hold on edge papers, pamphlets, and clippings, and are cleanest, cheapest, and best for most storage. Space not needed for pigeonholes in front of the desk is best used for vertical files or drawers. Telephone and desk light (with green porcelain shade to protect the eyes) should be on arms, to swing out of the way when not in use, and save desk space. Standard size pigeonholes, drawers, trays, and shelves should fill all blank wall space at left and behind, within reach from the swivel-and-spring desk chair. Some find a chair with curved spring back a help. Upholstery is heating and sometimes dangerous for constant use.

A model desk is 78 cm high, not 75 as is common. Drawers run to floor without baseboard and clear through to back and have side runs with no cross pieces. At no extra cost this gives easier action and maximum storage. All drawers are at least 9 cm deep inside to hold standard card trays. The centre opening for the feet is at least 60 cm wide with a centre drawer large enough for 50x60 cm standard large sheets often needed for charts and tables. Rows of drawers each side the chair have slides above them, as long as possible. On small desks extension leaves supported by folding brackets may be added to either end. Tops are 60 to 100 cm wide. The usual length, 150 cm [60 in.] is the largest top easily reached from the chair.

Office bells should be single stroke, not buzzers, to allow simpler codes of time-saving signals. Barometer or fountain sponge cup and mucilage stands save labor. If inkstands are used, the Perfect or some other pattern that prevents evaporation and so requires no refilling till ink is all used, is important. Self-inking rubber stamps for any words or dates often written save much time and give more distinct entries. If several are used they must be kept in racks plainly labeled or it takes as long to find the right one as to write the words. A metal

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straight edge exactly P size is much quicker than shears and ruler in fitting clippings and parts of sheets for trays. Printed blanks for everything much used, with alternatives both printed so that instead of filling in words, a single stroke crosses out those not wanted, reduce labor immensely. Printing is cheap, clerical labor costly. A letter sheet with months at the head of 12 columns, ruled with 31 numbered lines, gives a square for each day in the year and is invaluable for statistics or records.

Vertical writing, disjoined, is more like print and can be written as fast as the sloping hand which is so much less legible that libraries prohibit it on catalogue cards. Blotting blurs the sharp lines of writing and takes away some color. Ink should dry naturally. Odd size envelopes are a nuisance and go less safely in mails than standard sizes, as they project and are torn or crumpled in the post-office when tied in bundles. For notes and P cards use No. 5½, for 4P sheet (15 x 25 cm) No. 6½, for letter-sheet No. 8½. Never use for manuscript a sheet wider than 20 cm. Science proves this line twice too long for easiest reading, the best width of paper being 12.5 cm.

Typewriters.—No one tolerates pen work for letters written by clerks since it is known that typewriting is more legible, easier, faster, and cheaper, thus combining all four labor-saving elements. Many high salaried men have now learned that ease and speed make it well worth while to type such writing as they do with their own hands. If one writes at all, by as much as his time is more valuable than a \$10 clerk is the typewriter worth more for his personal use. The visible writers rapidly coming into use remove a serious objection, as each letter is in sight as written. By the touch system in growing use the operator never looks at the keys but strikes the right ones by touch, like a skilled pianist. (See *TYPEWRITER*.)

Fountain Pens are now as practical as dip pens, which are as absurd for the penman's constant tool as a muzzle-loading rifle for a modern soldier. Thousands have tried fountain pens and discarded them as failures, when they would have found them invaluable by observing these rules: (1) Select from a full line a pen exactly suiting the hand. More than 100 varieties of each first-class pen are regularly made. (2) Keep the gold pen bright by cleaning it often on a wet sponge. (3) Use a free-flowing standard ink, preferably filtered, and never mix inks or fill from a bottle open to air and dust. If clogged by poor or mixed inks or dirt, soak barrel and feeder thoroughly in water or wash out with alcohol. (4) To avoid top-heavy effect for sensitive hands, do not put cap on top of holder when writing.

Duplication.—Copying by hand was costly and untrustworthy. The copypress banished it. In turn this is largely superseded by the rubber roller copier, worked as easily as a clothes wringer and giving, with copying ink, five or more good copies if needed. The carbon sheet, usable with pencil or stiff, smooth-pointed pen, but best with typewriter, gives, with the one writing, 10 good copies on thin paper, or on cobweb paper 20 to 30. The best duplicator is the stencil cut on wax paper with typewriter and printed from a simple press up to several hundred copies, if needed, as permanent as other

printing. As the wax costs 8 cents a sheet, many have for temporary uses pans of composition on which anilin ink from pen or typewriter ribbon offsets. These use only common paper, are cheapest and quickest for temporary use if more than carbon copies are wanted, but anilin ink soon fades.

Card System.—This is easily greatest of labor-savers for literary and business use. With the modern library movement dating from 1876, its growth has been phenomenal and the saving effected more than money can measure. Instead of bound books, separate cards or sheets are used, on edge with frequently projecting guides, which enable one to find any item almost instantly. Matter may be added or removed at any point without recopying or disarrangement, so that the material is always up to date, and the plan is invaluable for every growing record, and has been adopted successfully for thousands of different applications. Its usefulness is diminished or destroyed unless the cards are cut to more exact height than common machines allow. A minute variation results in "bridging," that is, a low card between two higher ones is missed by the finger in turning. Equally important is it to have the best patterns of trays, supporting blocks, and locking rods to give the greatest possible speed in reference. Most patent devices for these purposes are useless. Libraries have by long experience found what gives best results. The international standard size card is 7.5 cm high, 12.5 wide, and is known as P or postal size. The United States Government prints its postcard, size K, and all its catalogue cards on this size, and the National and International Library and Bibliographic societies use this standard, which has in 25 years established itself beyond possibility of change. It is enough smaller than 3 x 5 inches, for which it is often mistaken by the inexpert, to make inch cards worthless in a standard index. They must be cut down to standard size or serious trouble will result.

This size is often found better to use in place of larger sheets for short bills, receipts, bank checks, etc., as they can be handled much quicker. The saving of space occupied seems trifling, but grows serious. Originally cards were over three times as large and were kept in a single row of covered boxes. The gain in number of cards stored on a given floor space was threefold when three rows of drawers replaced these boxes and 15-fold for the standard case 15 rows high; twofold more when cards were made half the thickness, twofold more when trays were made twice as long. Thus a library now stores 200 times as many cards on a given floor space, yet many are still embarrassed for lack of room. Single column trays with sides cut down to give more light and with label-holders in the pull have largely replaced the heavier two-column drawers. The best standard unit case is 2 to 3 pigeonholes wide and 15 high, each pigeonhole 9 x 29 cm and 50 cm deep, just holding 2 standard trays. Between the 6th and 7th rows of trays should be slides on which to rest drawers from pigeonholes too high or low to allow convenient reading. Short desk trays are 25 cm long with sides and partitions, if any, only 5 cm high, thus giving better light and easier handling than if full height of cards. All desk drawers should be full 9 cm

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deep to hold these trays. All cards should have an 8 mm hole near the lower edge, in the middle. For private use locking rods needed in public indexes may be omitted, but the hole is often needed to tie cards together or for special uses. Rods are to prevent removal and loss, so that a notch in place of a hole is bad, as cards can be bent a little and readily removed without tearing. A pocket binder with eyelets opposite the card holes and a tie cord and bar is the handiest way to carry cards. The best card stock, weighing 200 grams to a square.metre, is as good as the older 300 or 400 gram stock which took twice the space. Heavier cards are needed only for guides. These with projecting tabs more than double usefulness. Cards as well as guides can be had with these tabs, affording immense possibilities of double, triple and quadruple classification by tab, card color, ink color, and number or heading. For lighter cards 133 gram stock, two-thirds the weight of the light standard, is best. With it 300 times as many cards can be put in a floor space as with the simplest combination of old outfitts. The 100 gram stock, which is ordinary five-pound commercial note-paper, is also used where space saving and cheapness are more important than ease of handling.

The largest standard card index is L size, for cards 25 cm high by 20 cm wide. The drawers are 21.5 wide and 28 cm high inside, and outside are 27.5 x 30 cm by 50 cm long. They have rods and blocks with sides cut away like the P size, but drawers are on extension slides so that they can be opened to their full length. The unit is four drawers high from the floor, the highest that can be readily consulted standing. The best low unit is two L drawers high with a P drawer and an extension slide and table top above, making a case 78 cm high, 32 cm wide and 50 cm long. This stands at the end of a desk as an extension, or better at right angles, so all cards may be read without rising from the chair. Heavy manila guides 27 cm high have tabs 4 cm wide projecting 1 cm higher. Another projection from the middle of the bottom runs in a groove in the drawer bottom and has a stout eyelet through which the locking rod runs, a necessity for so large cards. For these large sheets two folios not used in P size are needed. A manila envelop 20.5 x 25.5 cm, open at the top and right side, holds together stiffly enough to hold thin papers on edge. The long folio is of manila 20 cm wide, 51 cm long, folded with front 24 cm, back 27 cm high. In the top smaller subdivisions than indicated in the projecting tabs of the guides are written and closer classification of papers is maintained. Manila, white, blue, buff and other colors are used for these folios when more than one classification is wanted in the same series, for example, personal papers mingled with office or firm papers on the same subject. Thus papers belonging to a half-dozen different parties can be closely classified together by subjects without confusing ownership which is instantly recognized by the folio color. This L size index fits most magazines, pamphlets, letters and typewritten documents and is the best working unit for all papers too large for P trays. It is much preferable to filing on the long edge because papers may be read in the drawer with letterheads, titles of articles, etc., at the top in the best light, exactly like

library catalogs. The commercial vertical files, 12 in. wide, 10 in. high are slower in use because folios must be lifted out and opened before consultation. So many use objectionably large sheets with a line twice too long for easy reading that the larger file will be used for commercial purposes till business men learn the advantages of never using a sheet larger than 20 x 25 cm. For all other uses the L size is vastly better and when letters or papers on larger size come in they are quickly folded once and dropt into regular place.

Intermediate sizes are seldom needed. B or billet (10 x 15 cm), N or note (12.5 x 20 cm) are largely used, but a single size, D or double P (15 cm high by 12.5 cm wide), is best and has the great advantage that a single fold makes a card from this exactly fit standard P trays now universally used. The standard large sheet for card index stock is 50 x 60 cm and to save waste aliquot parts of this should always be chosen. Ninety-nine times out of one hundred P, D or L size will be better than any other, and odd sizes are more expensive and often wasteful when indexes are combined or rearranged. If other sizes must be had for special use, they should be chosen from this full series:

Sym- bol	Name	Size in cm.
V	Visiting card	5 x 7.5
H	Half P	6.25 x 7.5
I	Index	5 x 12.5
P	Postal	7.5 x 12.5
B	Billet	10 x 15
D	Double P	12.5 x 15
N	Note	12.5 x 20
3P		12.5 x 22.5
4P		15 x 25
L	Letter	20 x 25

Arrangement in any card system is either A to Z, like a dictionary, or 1, 2, 3, or classified, both numeric and classed plans having alphabetic indexes on P cards. The numeric system is best for correspondents writing many letters or for special contracts or other business distinct but not obviously classed under any subject or name. For this use the short numbers 1 to 9 or 99 should be reserved for the heaviest correspondence. The rest are assigned and indext as subjects arise, the folios being kept in 1, 2, 3 order. They can be filed or found much quicker than by any other than Arabic notation, which is the simplest known to the human mind. The numeric file is very bad in scattering by accidental order matter on allied subjects which ought to stand side by side. Every system should have an alphabetic supplement for miscellaneous correspondents who write few letters, since it is self-indexed and its few papers are put away and found again more quickly than if classified or numbered and indext. A great file of papers is like a library in miniature. Experience the world over has proved that while alphabetic and numeric systems are invaluable for many purposes, usefulness demands close classing as material grows. The best plan is to combine simplicity of numeric and utility of classed as in the 'Decimal Classification and Relative Index' used by most libraries. The simplest possible printed index of 20,000 headings tells instantly by what number to mark or to find any paper, for example, bees are marked 638. This means sixth class Useful Arts, third division Agriculture, eighth section Bees. Every paper

LITERARY LABOR-SAVERS

about bees is marked 638 and goes in the drawer in numeric order where it can instantly be found by the printed index. Twenty-five years' use in a score of countries has proved this numeric system, with its relativ index, a marvelous labor-saver. Classification is a necessity if all material on any given subject is to be readily found. The labor of making one's own classification is usually prohibitive if well done. By adopting the scheme in general use by libraries this labor is saved and numbers are in harmony with those of thousands of other catalogs and indexes in which the same number has the same meaning; for as was pointed out at a recent international congress, these numbers are an international language of perfectly definite meaning among all civilized nations, and also cheapest and quickest in application.

Individuals like libraries may often wisely separate "dead" from "live" material. Correspondence and topics no longer often consulted are transferred to duplicate drawers, which for storage may be of cheaper construction. Working drawers and trays near the desk will thus be filled with matter oftenest used, while that removed is not tied in bundles or packt in boxes, but is kept best and most cheaply in P and L drawers, in a single series, so that matter removed at different times is all found in its exact numeric or alphabetic order regardless of date of removal. The index entry shows by an underscore topics removed to storage, so that no time is lost in double reference. This system has had a marvelous growth as people learn its economy of time and space. Formerly papers were folded, endorsed and tied in bundles. Flat filing in cabinets, minutely self-indexed without labeling, drove out this costly system. Vertical filing, like a library catalog, is in turn rapidly driving out flat filing cabinets. The loose leaf system is only a variation of the card index of which the essential is indefinite intercalation. Instead of standing on edge in drawers, loose leaves are put in a Unimatic or some other binder by a device which holds them like a book, opening flat but allowing leaves to be added or removed at any point almost instantly. For certain desk uses this is preferable to trays, but the tendency grows to put business ledgers, bank records and everything else in regular trays. The fear of losing detached pieces proves practically groundless and the saving over books is very large.

Colors.—These may be given mnemonic values in binding, paper or ink. Languages, not subjects, should guide in bindings if books are arranged, as almost universally, by subjects, for variety of color is important in finding and replacing books quickly. The language scheme used for 20 years by some libraries is:

1. American, light brown
2. English, dark brown
3. German, black
39. Minor Teutonic, dark blue *
4. French, red.
5. Italian, maroon.
6. Spanish, olive.
7. Latin, light green.
8. Greek, dark green.
91. Minor Aryan, light blue.
92. Semitic, yellow.
- 93-99. Hamitic, etc., light drab.

Colors beginning with the same letter as the subject are easier remembered, but should not be chosen if a distinctly better color is available.

Libraries use blue for bibliography, canary for criticism, green for biography. Slips are often arranged by days or months:

Sunday	sage green	Thursday	turquoise
Monday	melon		or manila
Tuesday	terra-cotta	Friday	fawn
Wednesday	white	Saturday	straw
January	white	July	blue
February	fawn	August	apple green
March	melon	September	straw
April	azure	October	orange
May	manila	November	nile green
June	jonquil	December	dove

The checklist below of paper colors for 26 letters omits most of those too dark to be written on or often confused. The second colors named often confuse with others first in the list elsewhere and so are seldom used. Letters with no available color are assigned the best unused, so as to give colors to all 26 letters if needed:

A	azure, apple green, amber
B	blue, buff, brown
C	canary, cherry, carmine, cream, café-au-lait
D	dove, drab
E	ecru
F	fawn
G	green, gold, gray, granite
H	heliotrope, hazel
I	ivory, indigo
J	jacqueminot, jonquil
K	corn
L	lilac, lavender, lemon
M	melon, mauve, marigold, manila
N	nile green
O	orange, old gold, olive
P	pink, primrose, pearl gray, purple
Q	Quaker drab
R	red, rose, robin egg
S	sage, straw, salmon, sky blue, steel
T	terra-cotta, turquoise, tea, tan
U	ultramarine, buff
V	violet, mauve
W	white
X	granite
Y	yellow
Z	zenith, manila

The favorite distinct colors to write on are white, buff, blue, canary, green, cream, manila. Melon or salmon soils worst from handling. As cards must be of uniform size to fit trays and drawers, the distinction of various circulars and blanks often made by shape is best made by color.

Ink Colors.—The best colors in order are: Black, red, blue, green; and least permanent, violet or lilac. Colors are used chiefly for figures or other short entries or for checking lists. Two, three or four pens or pencils can be carried between the fingers so that a check mark may be made instantly in either of four colors. Red is used for receipts, returns, income, renewals; blue for the reverse, payments, outgo, issues; green for gain; lilac for loss. Special meanings are assigned to check marks for each case and should always be written at the beginning of the list for future reference. Different colored inks or pencils are often assigned to different people working over the same lists so that color shows who made each mark. Where classification may change, color is better in ink than in paper as recopying can be saved by underscoring the first words in the new color which supersedes the old.

Exact Reference.—In indexes and other exact work indicate by superior figures the particular ninth of page or column in which the passage referred to begins; for example, 5:34⁸ means vol. 5, p. 34, beginning in third ninth of the page (about one-third the way down). Of superior figures, odd numbers 1, 5 and 9 denote top,

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middle and bottom of pages; 3 and 7, points half way between top and middle or middle and bottom, while even numbers are mere modifiers of these positions, 2 denoting a point a little below the top, 8 a point a little above the bottom; 4 and 6, points just above and below the middle. If there are several columns on a page, use two superior figures, the first denoting column and the second position in the column; for example, 7:89th means vol. 7, p. 89, beginning in the third ninth of column 1 and ending near the bottom (in the eighth ninth) of column 2. In condensed matter use the library date system (1) Day of week, (2) day of month, (3) month, (4) year:

Months						Days		
J	A	P	J	O	S ^u	T ^h		
F	Ap	My	Jl	N	M	F		
Mr	Je	S	G	D	Tu	St		
					W			

For Wed. 9 Sept. 1885, write W 9 S 85.

Numbers for months are dangerous. As usage is about equally divided, no one can tell whether 6-7 means July 6 or June 7. The L. B. dates above are exact and average fewer marks.

Numbers.—Use only Arabic numerals and letters and avoid the clumsy and easily misread Roman numerals; for example, Vol. 88, not Vol. LXXXVIII.

Newspaper Clippings.—These are almost useless unless closely classified. Plain manilla sheets 20 x 25 cm are better than any patent scrap-book. They are clasp like other papers with subject number on left upper corner and are kept laced in binders or much better in L drawers like thin pamphlets, thus bringing clippings, circulars, letters and notes on each minute topic all together in one folio.

Metric System.—John Quincy Adams reported to Congress that if metric weights and measures could be generally used they would be a greater labor-saver to the human race than steam. Since then nearly all civilized nations have adopted these measures, and America and England are both nearing such adoption. The international decimal system, agreeing perfectly with our arithmetic, stands near the head as a labor-saver. Computation showed that a single railroad could save \$50,000 a year in clerical labor by its use.

Colon Forenames.—In library catalogs where space is important, the most common full names are indicated by initials followed by a colon or double period, thus C:H:Smith is known to be Charles Henry Smith, while C. H. Smith may have any names beginning with C or H. With no extra space or cost the full name is given accurately by adopting C: A. Cutter's library list below:

A: Augustus.	A.: Anna.
B: Benjamin.	B.: Beatrice.
C: Charles.	C.: Charlotte.
D: David.	D.: Delia.
E: Edward.	E.: Elizabeth.
F: Frederick.	F.: Fanny.
G: George.	G.: Grace.
H: Henry.	H.: Helen.
I: Isaac.	I.: Isabella.
J: John.	J.: Jane.
K: Karl.	K.: Kate.
L: Lewis.	L.: Louisa.
M: Mark.	M.: Mary.
N: Nicholas.	N.: Nancy.
O: Otto.	O.: Olivia.
P: Peter.	P.: Pauline.
R: Richard.	R.: Rebecca.
S: Samuel.	S.: Sarah.

T: Thomas.	T.: Theresa.
U: Ulrich.	U.: Ursula.
V: Victor.	V.: Victoria.
W: William.	W.: Wilhelmina.
Z: Zenobia.	

Nine tenths of matter usually kept flat in drawers is better kept on edge in L size vertical files which are handiest and cheapest except for papers in constant use in open pigeonholes; cards in P trays and books and pamphlets on shelves. The best library shelf is 75 cm long, 20 cm deep and 25.5 high, thus taking all books up to octavo, 25 cm. Cases should be seven or eight shelves high with 15 or 20 cm ledge, if wisht, above the three lower shelves. The best pamphlet case is a plain wood box covered with marble paper, open only on the back. This is handier and more durable than costly patent boxes. Shelves, pigeonholes and blanks should all be read from top to bottom and from left to right like the columns of a newspaper, never jumping over the upright.

The most practical, cheapest and oftenest needed labor-saving is to use the fewest words and marks that will convey meaning readily and accurately. For definite lists and suggestions in economy of language, see NOTEHAND.

MELVILLE DEWEY,
Director New York State Library.

Literary Property. See COPYRIGHT.

Literature, Canadian. comprises in its widest acceptation, those phases of French and English literature, which, with an indigenous assimilation, have developed during and since the period of Canadian colonization and settlement. (See CANADA.) In its earliest stages it consists of the recitals of discovery and exploration of French explorers and Catholic missionaries, and the transported and localized traditions of the first Breton and Norman peasant immigrants, amassed and crystallized during successive generations, until they have reached the present century in a collection of literature of unsurpassed interest. After Canada became a British possession, by the Treaty of Paris in 1763, alongside of the continued development of French-Canadian literature, which, naturally was confined to settlers of French origin, chiefly in the Province of Quebec or Lower Canada, there arose an Anglo-Canadian literature fostered by the early British settlers, shortly afterward reinforced by the advent of United Empire loyalists, who at the close of the Revolutionary War, left the United States, and settled principally in the maritime provinces of New Brunswick and Nova Scotia, and in Ontario or Upper Canada. During the first half of the 19th century these growing branches of Canadian literature followed their divergent yet parallel courses, until after 1841, with the union of Upper and Lower Canada, and later with the confederation of the provinces, they found a common and sympathetic bond in the patriotic expression in both languages of the newly awakened sentiment of nationality, which has become an important factor in the political and general life of the Dominion. Canadian literature in all its branches includes authors, not only of native birth, but also numerous British, French, and other writers, who have settled or resided in the Dominion, and imbued by sentiments and interests wholly Canadian, have enriched its annals with their contributions.

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The earliest writings on Canada, dating from 1599, are those of the explorer Champlain, which frequently republished, are collected in the six volumes' issue edited by Laverdière and published at Quebec in 1870. Other early productions are Lescarbot's 'Histoire de la Nouvelle France' (1609), and 'Les Muses de la Nouvelle France'; La Pothérie, 'Histoire de l'Amérique Septentrionale depuis 1534 jusqu'à 1701' (4 vols. 1722); Lafitau, 'Mœurs des Sauvages amérindiens' (1724); Charlevoix, 'Histoire et Description générale de la Nouvelle France' (3 vols. 1744); while a mass of interesting material is contained in 'Rélations des Jésuites' which can be consulted in the collection of 71 volumes, edited by Thwaites, with an English translation, and published at Cleveland, Ohio (1896-1901).

Among the first works of native authorship are Bibaud 'Histoire du Canada sous la Domination française' (1837) and 'Histoire du Canada sous la Domination anglaise' (1844); Garneau, 'Histoire du Canada' (1845-52). These were followed by Casgrain, 'Légendes canadiennes' (1861) and 'Biographies canadiennes' (1885); Boucher de la Bruère, 'Le Canada sous la Domination anglaise—Analyse historique' (1863); Tanguay, 'Dictionnaire généalogique des Familles canadiennes depuis la Fondation de la Colonie jusqu'à nos Jours'; and the celebrated work of the prolific Sulte, 'Histoire des Canadiens français' (8 vols. 1882-4). To these French-Canadian historical writers may be added L. O. David 'Les deux Papineau' etc.; P. De Cazes, De Celles, De Montigny, N. E. Dionne, G. A. Drolet, J. E. Roy, J. B. A. Ferland, L. Turcotte, A. H. Gosselin, etc.

In the 'Chansons populaires du Canada' and the 'Cantiques populaires du Canada-français' edited with music, Ernest Gagnon, organist and composer, has preserved the Canadianized songs of early Breton and Norman importation and the earlier native effusions, while an excellent general view of French-Canadian poetry by the versatile B. Sulte, himself a popular poet, is 'La Poésie française au Canada' (1881). Among the better known French-Canadian poets are L. H. Fréchette, 'Les Fleurs boréales' and 'Les Oiseaux de Niège'; O. Crémazie, 'Le Drapeau de Carillon,' etc.; J. (Mrs.) Dandurand, 'Les Contes de Noël,' etc.; J. L. Archambault, 'Jacques Cartier,' a historical drama; L. P. Lemay, 'Essais poétiques,' etc.; N. Legendre, 'Echos de Québec,' etc.; L. J. C. Fiset, A. B. Routhier, 'Les Echos,' etc.

French-Canadian fiction is represented by P. De Gaspé, 'Les anciens Canadiens' (1863); J. Marmette, 'L'Intendant Bigot' (1872), etc.; H. Beaugrand, 'Jeanne la fileuse'; N. Bourassa, 'Jacques et Marie,' an Acadian romance, etc.; P. J. O. Chauveau, L. P. Lemay, C. A. N. Gagnon, etc.

Anglo-Canadian literature commences with the account by Samuel Hearne, 'A Journey from Prince of Wales's Fort in Hudson's Bay to the Northwest' (1795), being the recital of a pedestrian trading journey of 1,300 miles to the Great Slave Lake. This was followed by A. Mackenzie, 'Voyages on the River Saint Lawrence and Through the Continent of North America to the Frozen and Pacific Oceans' (1801); J. Bouchette, 'A Description of the Canadas' (1815-32); W. Smith, 'History of

Canada' (1815), and J. Howe (a Nova-Scotian), 'Western and Eastern Rambles.' One of the first distinctive native authors was Judge T. C. Haliburton of Nova Scotia who, in 1835, with 'The Clockmaker, or Sayings and Doings of Sam Slick of Slickville,' originated the dialect humor which is generally looked upon as a United States product. Judge Haliburton was the author also of a 'History of Nova Scotia,' while Francis Parkman (1823-93), the American historian whose researches occupied more than forty years, in his monumental standard works 'Pioneers of France in the New World' (1865); 'The Jesuits in North America' (1867); 'La Salle and the Discovery of the Great West' (1869); 'The Old Regime in Canada' (1874); 'Count Frontenac and New France under Louis XIV.' (1877); 'Montcalm and Wolfe' (1884); 'A Half-Century of Conflict' (1892); was the first to lay the Rélations des Jésuites under contribution and do for Canada what Prescott did for Mexico. Among a long list of Canadian historians are G. M. Adam, 'The Canadian Northwest; its History and Troubles' (1883); J. S. Archibald, 'The Relations of the Two Races in Lower Canada'; A. Begg, 'History of the Northwest' (1894-5); G. Bryce, 'History of the Canadian People' (1887), etc.; J. G. Bourinot, 'Canada under British Rule' (1900), etc.; R. Christie, 'History of Lower Canada' (6 vols. 1849-55); W. Canniff, 'Canadian Nationality' (1875), etc.; J. B. Crozier, 'Civilization and Progress' (1885); J. C. Dent, 'The Story of the Upper Canada Rebellion' (2 vols. 1885-6), etc.; J. Hannay, 'History of Acadia' (1879); O. A. Howland, 'The 400th Year of Canadian History,' etc.; W. Kingsford, 'History of Canada' (10 vols. 1887-97); J. M. McMullen, 'History of Canada' (1855); E. Richard, 'Acadia' (2 vols. 1895); H. Scadding, 'Toronto: Past and Present' (1884); C. G. D. Roberts, 'History of Canada' (1897); W. H. Withrow, 'History of Canada' (1880), etc. Chief among modern historians native or resident is Professor Goldwin Smith (q.v.), living in Toronto since 1871, whose 'Canada and the Canadian Question' (1891) is a minor work in the long list of his valuable publications of world-wide interest.

The list of Anglo-Canadian poetry is a long and worthy one, and among its most notable exponents are Bliss Carman and Sir H. Gilbert Parker (q.v.); I. V. Crawford, 'The Master Builder,' 'The Axe of the Pioneer,' etc.; G. F. Cameron, 'What Reck we of the Creeds of Men,' etc.; A. Lampman, 'Among the Millet' etc.; J. W. Bengough, the versatile poet, humorist, and cartoonist, one of the most tender and graceful of Canadian elegiac poets; C. G. D. Roberts, 'Poems of Wild Life,' 'Canadians of Old,' etc.; Wm. Kirby, 'The U. E.,' 'Canadian Idylls,' etc.; J. A. Allen; D. Anderson, 'Lays of Canada'; J. G. Ascher, 'Voices from the Hearth' (1863); C. L. Betts, 'Songs from Berger,' etc.; J. (Mrs.) Blewett; J. H. Brown; W. W. Campbell, 'The Mother,' etc.; J. (Miss) Carnochan, 'Has Canada a History,' etc.; M. R. (Miss) Charlton; C. A. (Miss) Frazer; A. R. (Mrs.) Christie, Annie Rothwell, poet and novelist; G. G. Currie, 'How I Once Felt: Songs of Love and Travel'; S. A. (Mrs.) Curzon, 'Laura Secord, the Heroine of 1812,' a drama; E. H. Dewart, 'Songs of Life,' 'Selections from Canadian Poets'; A. G. Doughty; W. H. Drum-

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mond, 'The Papineau Gun'; 'Johnnie Courteau and other poems'; A. W. H. Eaton, 'Acadian Legends and Lyrics'; C. (Miss) Fairbanks; J. K. Foran, 'Poems and Canadian Lyrics'; C. S. Goodhue; J. M. Harper; S. F. (Mrs.) Harrison, 'Pine, Rose, and Fleur de Lis'; C. Heavysege, 'Saul'; S. M. A. (Mrs.) Hensley, 'A Woman's Love Letters' (1895); S. Hunter-Duvar; J. Inrie; E. P. (Miss) Johnson; R. K. Kerningham, 'Men of the Northern Zone,' 'Canada First,' etc.; W. D. Lighthall, poet and novelist, 'Songs of the Great Dominion,' etc.; A. J. Lockhart; C. Mair; G. Martin, 'Marguerite, or the Isle of Demons' (1887); S. (Mrs.) Moodie, sister of Agnes Strickland; M. (Miss) Morgan; A. Muir, 'Canada,' 'The Old Union Jack,' 'Canada, Land of the Maple Tree,' 'Canada Forever,' etc.; G. Murray, 'How Canada was Saved,' etc.; E. MacColl; D. McCaig, 'Milestone Moods and Memories'; W. McLennan, 'Songs of Old Canada,' etc.; T. O'Hagan, poet, critic and essayist, 'Songs of the Settlement,' 'Canadian Essays, etc.'; T. H. Rand, the Canadian Browning, 'At Minas Basin and other poems'; J. J. Roche, 'Songs and Satires'; C. Ryan, 'Songs of a Wanderer,' etc.; F. G. Scott; A. M. Sinclair; E. H. Stafford; B. Stratton; J. S. Thompson, 'Estabelle and other Verse'; etc.

Although of native birth and claimed as a Canadian writer, Grant Allen, novelist and naturalist, is typically Anglo-Saxon in the universality of his works, fictional and otherwise. The greatest writer of fiction Canada has produced is Sir Gilbert Parker (q.v.), 'the literary discoverer of the Northwest,' who in 'Pierre and His People' (1892); 'When Valmont came to Pontiac' (1895), 'The Seats of the Mighty' (1896), and 'The Right of Way' (1901), has anglicized French-Canadian themes with a vigor and interest of world-wide celebrity. Even when he has traveled foreign for his subjects, their nationality curiously exhibits a mixed colonial influence of Canadian origin as in 'The Battle of the Strong,' the scene of which is laid in 'Little Known Normandy—the Island of Jersey,' whence came the ancestors of many early Canadian colonists, represented in the Canadian literary world at this day by, among other descendants, J. E. Le Rossignol, noted for his philosophical and other essays, and by W. D. Le Sueur, whose literary and critical essays on 'Matthew Arnold,' 'Bernardin de St. Pierre,' 'Saint-Beuve,' etc., are of a high order. Among other writers of native fiction are G. M. Adam with A. E. (Miss) Wetherald in 'An Algonquin Maiden'; K. M. (Miss) Barry, numerous novels, including 'Honor Edgeworth, Ottawa's Present Tense,' 'The Doctor's Daughter, a sketch of Canadian social life and character'; R. (Miss) Barry; M. (Mrs.) Catherton; P. Cox, artist and author of 'The Brownie Books,' etc.; J. Croil 'Dundas: a sketch of Canadian history'; S. J. (Mrs.) Cotes, 'The American Girl in London'; F. B. Crofton, 'The Major's Big Talk Stories'; E. A. Cruikshank, military subjects; A. Davies, 'Canadian short stories'; L. (Miss) Dougall, 'Madonna of a Day' (1896); E. L. (Mrs.) Estey; J. Galt, 'Laurie Todd or the Settlers in the Wood' (1830); J. B. (Mrs.) Hammond; S. F. (Mrs.) Harrison; H. E. (Mrs.) Hayes (Mary Markwell); T. S. Jarvis, 'Doctor Perdue,' 'The

Ascent of Life,' etc.; A. R. (Mrs.) Logan 'Children of the Hearth'; B. L. (Miss) Macdonell, 'Tales of the Soil,' etc.; J. N. (Miss) McIlwraith (Jean Forsyth); W. McLennan; E. J. (Miss) McManus; G. A. (Mrs.) Newhall; J. M. Oxley; J. Richardson, 'Wacousta, or the Prophecy' (1833); J. A. Phillips, 'Out of the Snow,' etc.; R. Pocock, 'Tales of a Western Life'; M. A. (Mrs.) and A. T. (Miss) Sadlier; M. M. (Miss) Saunders, 'Daisy' (1892), 'Beautiful Joe' (1894); E. E. Shepard; E. W. Thompson; H. B. Willson; E. R. Young; etc.

The list of notable Canadian essayists and miscellaneous writers in all branches of theology, philosophy and science is too long to be enumerated here, but of purely literary critics and essayists besides W. D. Le Sueur already mentioned may be cited W. J. Alexander, R. G. Haliburton, T. A. Haultain, J. C. Hopkins, N. F. Davin, S. E. Dawson, A. M. MacMechan, T. O'Hagan, L. J. A. Papineau, T. Watson, etc., while in the collected and published speeches of J. Howe, Sir W. Laurier, Alexander Mackenzie, Sir John Macdonald, Sir Charles Tupper, etc., Canada has a rich anthology of oratorical literature.

Consult: G. M. Adam, 'Outline of Canadian Literature'; Bourinot, 'Canada's Intellectual Strength and Weakness,' and 'Intellectual Development of the Canadian People.'

CHARLES LEONARD STUART, B.A.,
Editorial Staff, 'Encyclopedia Americana.'

Litharge, lith'arj (Greek, silver-stone), the fused oxide of lead as got in the cupellation of silver and gold. See LEAD.

Lithia, in chemistry, oxide of lithium (q.v.).

Lithia Mica. See LEPIDOLITE.

Lithic Acid. See URIC ACID.

Lith'ium, a name applied to an alkali discovered in 1817. It was derived from the Greek *lithos* (a stone), in allusion to the existence of the alkali in a stony mineral. Lithia has since been detected in spodumene, lepidolite, triphyllite, amblygonite, tourmaline, meteoric stones, mineral waters, coffee, tea, blood, milk, etc. A process for procuring it is the following: One part of petalite or spodumene in fine powder, is mixed intimately with two parts of fluor-spar, and the mixture is heated with three or four times its weight of sulphuric acid, as long as any acid vapors are disengaged. The silica of the mineral is attacked by hydrofluoric acid, and dissipated in the form of fluosilicic acid gas, while the alumina and lithia unite with sulphuric acid. After dissolving these salts in water, the solution is boiled with pure ammonia to precipitate the alumina; is filtered, evaporated to dryness, and then heated to redness to expel the sulphate of ammonium. The residue is pure sulphate of lithium. Its color is white; it is not deliquescent, but absorbs carbonic acid from the air; it is soluble in water; it is acrid and caustic, and acts on colors like the other alkalies; heated with platinum it corrodes it rapidly. It combines with the different acids, and forms crystallizable salts with them. The phosphate and carbonate are sparingly soluble; the chloride is deliquescent and soluble in alcohol, and this solution burns with a red flame. Unlike the other alkalies it cannot be reduced from its car-

LITHOGRAPHIC CRAYON — LITHOGRAPHY

bonate by carbon, but it requires the action of a galvanic battery. The compound employed is the chloride, which, while in a state of fusion, is acted on by the battery. Small globules collect round the negative pole, and these are removed and cooled under petroleum. It is the lightest of metals. It has a bright silver-white metallic lustre, melts at 356° F., and can be welded at ordinary temperatures. It is rather harder than potassium, can be drawn into a wire, but has a low degree of tenacity. Exposed to the air it tarnishes, but it combines with oxygen less rapidly than either sodium or potassium. It decomposes water, and when heated in oxygen, chlorine, and other gases, burns with a brilliant light.

Compounds of lithium are used in pyrotechny on account of the splendid red color they impart to flame. In medicine the carbonate is employed especially as a solvent for uric acid, to prevent the formation of calculi and to remove it from the system in gout. Effervescent lithia water is sometimes used in place of soda or potash water. Citrate of lithia is also employed. It is a white, soluble, crystalline salt, prepared by dissolving the carbonate of lithium in citric acid. Its therapeutic properties are similar to those of the carbonate.

Lithograph'ic Crayon. See LITHOGRAPHY.

Lithographic Stone. See LITHOGRAPHY.

Lithography (*Greek, lithos*, stone and *graphein* (to write), may be divided into two distinct branches—lithography proper, the art of writing, drawing or engraving on stone, and chemical or surface printing from stone or metal, by means of which such writings, drawings or engravings are multiplied, in a manner differing essentially from letter-press or relief printing on the one hand and steel and copper plate or intaglio printing on the other. Lithographic printing is based upon the chemical principle of antagonism of grease and water and upon the porous nature of the printing surface. By virtue of this property, a drawing made upon such surface with unctuous ink or crayon will adhere to it so firmly that its eradication can only be effected chemically by means of strong acids or mechanically by entirely removing the surface with the design. The parts of the surface containing the drawing or design will accept and hold grease or ink, and those parts of the surface free from design will receive and retain water to the evaporating point. Thus if a roller covered with fatty printing ink is passed over the printing surface previously moistened, the ink will attach itself only to the parts constituting the design and will be repelled by the moisture covering the remaining part of the surface, in consequence of which the design only will appear in the impression.

History.—Aloys Senefelder is generally conceded to be the inventor of lithography, although in certain quarters claims have been put forth in favor of Simon Schmidt of Germany. The latter's claims, however, are without much basis. As early as 1788 he printed from stone, but his idea bore no relation to Senefelder's discovery, ten years later, of chemical or surface printing. Schmidt merely substituted stone for metal in relief printing, which bears no resemblance whatever to the process of lithography. Sene-

felder was born at Prague in 1771 and at an early age removed to Munich, where his father was employed as an actor at the Theatre Royal. The future inventor had a bent for his father's calling, but parental opposition finally induced him to enter the university at Ingolstadt as a law student. His college days were shortened, however, for soon after his entrance, his father died, thus throwing the youth upon his own resources. His attempts at supporting himself met with indifferent success. First as an actor and then as a playwright, he proved a failure, but this very circumstance had much to do with his ultimate discovery of chemical printing. His inability to get his work as a playwright published in the usual way bestirred him to devise some means of doing it himself. Thus he set about to become familiar with the printing art, which culminated in the purchase of a small press. Too poor, however, to pay for the engraving of his compositions, he next turned his attention to etching on copper. His inexperience in forming the reversed characters on the plate led to frequent errors, and not being familiar with the "stopping out" solution used by etchers in rectifying mistakes, he succeeded in devising one of his own. The ingredients he used were those nearest at hand—the wax with which he coated the plates previous to etching, the soap with which he washed the ink from the plates and the lampblack which he used in preparing his ink for printing. Thus accidentally he discovered the composition which forms the basis of all crayons and lithographic drawing inks. The labor attached to grinding and repolishing the copper plates led him to experiment with a fine piece of Kellheim stone, originally purchased to grind his ink with. After treating this in precisely the same way as copper plates, he succeeded in getting some fairly good impressions. Subsequently it occurred to him to reverse the etching process by writing on the stone with the "stopping out" composition and biting down the surface with aqua fortis. This brought out the character in relief, which he inked in and printed in the manner of type. Further experiments led to the discovery that relieving the characters was altogether unnecessary and that the simple process of writing on the stone with his composition of wax, soap and lampblack produced the same results. This was in the year 1798 but it was not until eight years later that the inventor succeeded in establishing himself as a lithographic printer in Munich. This city thus became the centre of the art, and three years thereafter no fewer than seven separate concerns were established, as well as a number of private presses. Senefelder died in 1834, and since then there has been little or no change in the method he laid down, the inventor having exhausted almost its entire possibilities. While to Senefelder is due the lion's share of praise, many others of the early lithographers are entitled to great credit, they having done much to develop and foster the craft. Piloy in 1808 published 432 copies of the old masters, and in 1815 reproductions from the Munich gallery. His partner, Lochie, was also conspicuous in the early development of lithography, as well as Count Lasserie, who introduced the art in Paris. It fell to Godfrey Engelmann to

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found the first permanent establishment in Paris. This was in 1816. In 1837 he was granted letters-patent on the invention of chromolithography. The first house in Berlin was established in 1834 by Franz Hanfstängel, and in London in 1822, by Hullmandel, a pupil of Engelmann of Paris. Senefelder himself attempted to establish himself in London, but failed, owing to some difficulty with his partner, André, of Offenbach.

Lithography as an art reached its climax in Paris during the reign of Louis Philippe. Among the masters who distinguished themselves were the satirists Daumier, Grandville, Travies and Gavarni, Deveria, Delacroix, Joffannot and Gigoux, the delineators of romantic literature; Charlet and Raffet, who found material in the glorification of Napoleon's career. Other painter-lithographers of the day were Géricault, Richard Park Bonington, James Duffield Harding, Eugene Isabey, Alexandre Calame and Julien, whose "Etudes en Deux Crayons" made his famous. Since the introduction of the power press and the consequent development of the lithographic industry as a commercial factor, the medium of lithography has found less favor as a mode of artistic expression, but efforts are now being made to create renewed interest in an art so true in its reproduction of the artist's pencil. Commercially it has grown to be one of the most important branches of the printer's craft, as evidenced by the fact that in the United States alone, according to the census of 1900, the capital invested was \$22,676,142, and employment was given to almost 14,000 people.

Materials.—The stone used for purposes of lithography is a compact, homogeneous limestone of porous texture, known as "lithographic stone." It varies in color from a light cream, dull yellow, drab or gray to darker shades of the same colors, the best being found among the light gray varieties. The dark blue-gray or French stone is very fine in texture, but is not favored generally by either the artist or the transferrier, as its color does not contrast sufficiently with that of the design to enable the manipulator to gauge his work as well as on a light gray stone. Lithographic stone is quarried chiefly at Solenhofen, Germany, and while similar stone has been found in England, France and America, none possess the quality of the Solenhofen product. It is sawn at the quarries into slabs of from 3 to 4 inches in thickness, varying in size from 6 x 8 inches to 44 x 64 inches, and is sold by weight. The cost, as compared to its area, increases, not simply arithmetically, in proportion and weight, but in geometrical progression, as in the case of diamonds and other precious stones. Thus a stone measuring 3 x 4 inches, weighing 20 pounds, costs 1½c per pound, and a stone measuring 44 x 64 inches, weighing 1,200 pounds, may cost as much as 40c per pound. The common occurrence of hidden flaws in stones, leading to fracture under pressure when printing therefrom, and the difficulty of securing large stones without blemishes, such as chalk spots or veins, has been a source of constant trouble. For this reason, as well as owing to the expense incurred in handling and storing the cumbersome stone, a substitute embodying the same

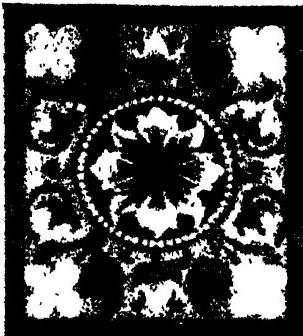
properties has been the desideratum of lithographers almost since the invention of surface printing. Zinc has been in use for 50 years or more, and while it possesses the necessary qualities to a limited extent, it has never proved useful for any but the most ordinary grades of work. Other metals and materials, as well as artificial stones have been tried, but none were found suitable, until with the introduction of aluminum as a trade article, experiments with that metal were made by John Mullaly, of New York, and later by Otto C. Strecker, of Mainz, Germany, resulting in the almost universal adoption of this metal as a perfect substitute for the lithographic stone. Designs can be removed from either stone or metal plates and their surfaces prepared for the reception of new designs. A stone 4 inches thick or an aluminum plate 29/1000 of an inch thick can thus be used approximately 200 times. Lithographic crayon is composed of beeswax, shellac, tallow, mastic turpentine, soap and lampblack. It is made in several degrees of hardness. For crayon work the surface of the stone is always grained by means of grinding with clean, sharp sand and water between two slabs of stone. Lithographic ink adapted for pen work on stone contains the same ingredients as used for the crayon with a larger quantity of the soap, in order to make it soluble in water. The ink is furnished in sticks and rubbed over a plate or saucer and then gradually dissolved with water or turpentine until it becomes fluid. Gum arabic and acids are important factors in lithography; in fact, Senefelder's original invention would have proved of little practical value had he not also discovered their uses in reinforcing the qualities of the stone. When a drawing is completed on stone, its surface is treated with a solution of gum arabic and nitric acid, effecting a chemical change in its nature where it is not protected by the grease or ink of the drawing. The carbon is freed and a nitrate deposited in the form of a full grained pellicle, the pores of which retain the gummed water, thus creating a surface impermeable to grease. Furthermore, the drawn parts are rendered insoluble in water by decomposing the alkali contained in the soap—one of the component parts of lithographic crayon or ink. The object of this etching is not to elevate the drawing—the relief, if any is obtained, being hardly perceptible, and although it tends to make the impression cleaner and sharper, is not absolutely necessary.

Process.—After the stone is etched, it is washed successively with water and turpentine. When wiped clean, the surface at first glance appears to be perfectly blank, but on closer inspection shows a faint suggestion of the design in white on the face of the stone. After being repeatedly moistened and rolled in with printing ink, the design reappears and accepts the ink. It is then covered with a weak solution of gum arabic and is ready for printing. A drawing on stone is necessarily reversed and it requires considerable experience on the part of the artist to obtain proficiency in thus rendering a reverse facsimile of the original. In the hands of an experienced and capable artist no reproductive art can offer greater possibilities than that of crayon drawing on a grained stone.

LITHOGRAPHY.
Plates and Printing required for Design of Six Colors.



1. Cutline of Design.



2. First Color Plate.



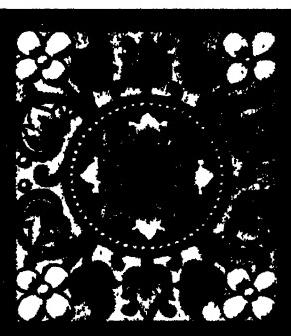
3. Second Color Plate.



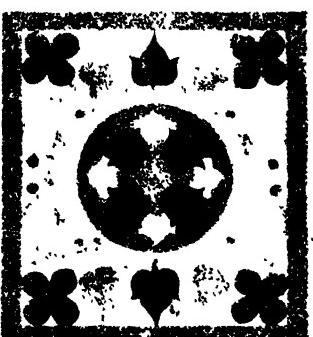
4. First and Second Color Plates Combined.



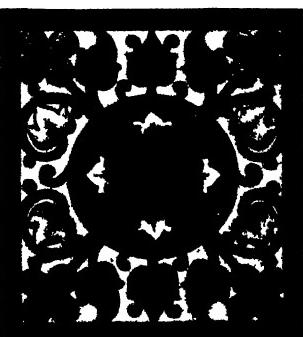
5. Third Color Plate.



6. Combination of Three Color Plates.



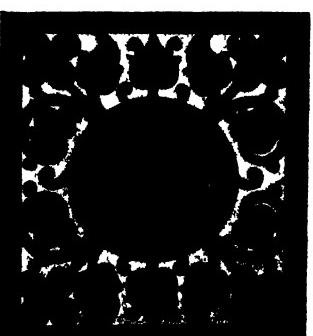
7. Fourth Color Plate.



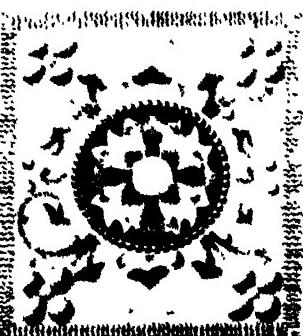
8. Four Color Plates Combined



9. Fifth Color Plate.



10. Five Color Plates Combined.



11. Sixth Color Plate.



12. Printing Complete in Six Colors.

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It permits greater freedom as compared with steel, copper plate or wood engraving, inasmuch as technique is less important in lithographic crayon work than true artistic ability, while an infinite variety of tones, from the most delicate shade to rich, deep black, lies within its possibilities. Somewhat more mechanical is the pen stipple manner, which, as its name implies, consists of drawing with small dots, the relative values of shading being determined by the varying density of the dots. This manner is employed mainly in chromo-lithography, its chief recommendation being the clean, sharp, solid nature of the work, and it is therefore particularly adapted to large editions of printing. The greatest achievement of lithography undoubtedly centres in the reproduction of oil paintings and aquarelles, commonly known as chromo-lithography. Either the crayon or pen stipple manner alone or both together, in connection with other manners, such as "rub tints," "asphalt tints," etc., are brought into the work. Its most simple form is the tint used for crayon drawings; its highest, the reproduction in colors of an oil or water color painting, requiring a series of drawings on separate stones—one for each of the colors necessary to produce the facsimile. The important feature is to obtain a perfect register of the various printings, as any deviation of the correlation of the colors will tend to produce entirely foreign effects. One of the methods whereby this is accomplished is making a key plate. An accurate detailed tracing is made of the original by means of an engraving-needle, scratching the surface of a sheet of transparent gelatine or celluloid, indicating the boundaries of even the most minute patches of color. The engraved lines are charged with lithographic ink and then transmitted to stone by pressure. After the register marks (usually in the shape of crossed lines) have been put in the margins of the key plate, the stone is etched and rolled up with printing ink, and impressions corresponding to the number of colors or printings to be employed are made therefrom. The impressions are powdered with finely ground dry powder (usually Venetian red), which adheres only to the outline of the design, and then transmitted by pressure to the surface of clean stones. These so-called "offsets" of the key serve as a guide for the artist in making his color plates. In cases where no key of the original is made, offsets from the drawing of the black supplied with the necessary register marks answer the same purpose. The number of colors necessary to produce a given result varies largely, according to the nature of the original to be reproduced, ranging for commercial purposes from three to fifteen, although where especially fine results are desired, 20 or more colors may be required. The stone-engraving manner—used extensively for commercial stationery in imitation of steel engraving—is based on the same principle, although the mode of procedure differs in every respect. For this purpose the stone is polished, its whole surface is first prepared or etched with gum-water acid and covered with a dark ground consisting of lampblack in solution with gum-water or albumen. Into this ground the design is engraved or scratched with an engraving-needle or a diamond. Then linseed

oil is poured over the whole, which is absorbed by the stone where the needle has laid it bare. The ground is washed off, the surface moistened and printing ink rubbed in with a tampon or dauber, the ink adhering only to the lines of the design, by reason of the oil which they have absorbed.

Photography.—Since its invention, photography has been more or less allied to the lithographic art. Its most common application is the process called "photo-lithography," by means of which pen drawings are transferred to lithographic stone at comparatively small expense. The half-tone or Meisenbach process has also been advantageously applied—particularly in chromo-lithography—in furnishing a basis for the several color plates, in place of the key, usually assuring a more faithful reproduction of the original than would be possible otherwise. One of the earliest photo-lithographic processes in use is that of Lemercier, patented in 1852, which is based on the sensitive property of asphaltum, discovered by Niepce in 1833. A lithographic stone is coated with a solution of asphaltum in oil of lavender and exposed to light under a half-tone negative, the film of which has been turned on the glass to secure the necessary reversed position, effecting a slow change in the asphaltum. The parts thus affected by the light become insoluble in turpentine, leaving the other parts soluble. Thus a (reversed) positive is rendered on stone, which, owing to the unctuous nature of its composition, can be prepared for printing purposes in the usual manner. The method most commonly used is the albumen process, invented by Poitevin in 1855. In this case the stone is coated with albumen in solution with bichromate of potassium, which is much more sensitive to light action than asphaltum. After exposure the stone is immediately covered with printing ink, to prevent further action, and washed with water, which removes the parts that remain soluble, while the ink adheres only to the parts that have become insoluble.

Transferring Process.—Unless limited editions are required, designs that have been drawn or engraved on stone are very rarely printed from directly. By means of the transferring process one design may be reproduced as many times as the relative size of the work and sheet to be printed will allow—ensuring greater economy in printing and greatly reducing the risk of damage to the original drawing stone. Transfer impressions are taken on a paper coated with a sizing of starch and glycerine, with a specially prepared ink. These impressions are laid in their proper position on a sheet of paper of the required size and fastened to it by means of pricking with the dull point of an engraving-needle. The sheet, the transfers adhering, is laid face down on a clean, polished stone or aluminum plate and repeatedly pulled through a hand-press, until the transfers adhere firmly to the stone, the paper being frequently dampened during this process. This done, the sheet is carefully raised from the stone, leaving the thin paper transfers still adhering to its surface. These then in turn are dampened and carefully removed. A weak solution of gum and water is applied and the stone rolled up repeatedly with printing ink.

LITHOTOMY—LITITZ

To make the transfer ready for printing, it is etched in the same manner as an original drawing. In chromo-lithography the first transfer made is always that of the key-plate, supplied with register marks. The impression from this transfer is mounted on a sheet of aluminum or zinc and coated with shellac to ensure against stretching or shrinking. All succeeding transfers are "stuck-up" or fixed on this key-sheet, in order to enable an accurate register of the colors.

Lithographic Printing.—The lithographic hand-press differs essentially from both the type and copper-plate hand-presses, a scraper being used instead of the vertical pressure of the platen. It consists of a frame provided with rollers on which the bed runs to and fro, the scraper or impression-bar and a tympan of leather, fitted to an iron frame hinged to that end of the bed nearest the scraper. The scraper consists of a flat piece of box-wood, beveled on both sides and covered with leather. The manner of printing is as follows: the stone with the design upon it is placed face up upon the movable bed, then moistened with a sponge, rolled up with ink and the sheet which is to take the impression, laid thereon. Several sheets of paper are placed over it to secure the necessary backing, the tympan lowered upon it to cover the entire bed and stone, and the carriage brought forward under the scraper. Pressure is applied by means of a hand-lever at the side of the press, and the entire length of the bed passed under the impression bar. The pressure is then released, the bed brought back to its original position, the tympan raised and the printed sheet taken off. Until the introduction of the lithographic power-press in 1867, this method of printing was exclusively used for lithographic printing. At the present time its only utility is for the purpose of making artist-proofs and transfers for printing on power-presses. The lithographic power-press differs but slightly from that of the typographic power-press. The principle of operation remains the same, taking in place of the letter-press form a lithographic stone in its bed and being supplied with a contrivance for distributing the moisture with which the stone must be covered before the ink is applied. The use of rotary printing-presses, with an increased speed of 50 per cent over the flat-bed presses, has been made possible by the substitution of the flexible aluminum plate for lithographic stone, and has opened the field of multi-color printing by the lithographic process, whereby two or more colors are printed in rapid succession before the sheet is delivered. The rotary press consists principally of two cylinders—one to hold the plate and the other to furnish the pressure—and is supplied with a mechanism similar to that of the flat-bed press for distribution of moisture and ink. Rotary presses having two and three plate cylinders and printing respectively two and three colors each time a sheet is fed are already largely in use, and four-color presses are now being built on the same general principle.

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lithographie' (1849); Richmond, 'Grammar of Lithography' (1879, 1880, 1881, 1883 and 1885); Weishaupt, 'Das Gesammt Gebiet des Steindrucks, nebst Anhang von der Zinkographie' (1865); Weishaupt, 'Theoretisch-praktische Anleitung zur Chromolithographie' (1847).

OTTO W. WILHELM, Of Sackett & Wilhelms Lithographing and Printing Company, New York.

Lithotomy, in surgery, the operation of cutting for the stone. (See CALCULUS.) As usually performed it consists in cutting by the side of the anus in the perineum, so as to reach and divide the urethra and neck of the bladder, where it is surrounded by the prostate gland. A grooved and curved staff is introduced into the bladder first, and then the incision is made in the perineum to reach the bladder, the groove in the staff serving as a guide to the knife. When the calculus or stone is felt with the finger the staff is withdrawn and the stone extracted by means of forceps, proper treatment to ward off inflammation and other accidents being then adopted. When thus performed, unless there be unusual difficulties, the length of time required to extract the stone is seldom more than three minutes, often one or one and a half. At first the urine escapes through the wound, but in favorable cases it issues by the natural passage within a week, and the wound heals in the course of a month.

Lith'otry, in surgery, the operation of crushing a stone in the bladder into fragments of such a size that they may be expelled by the urethra. The instrument, called a lithotrite, by which the stone is broken up, is introduced in the same manner as a catheter or sound into the bladder, and after catching the stone crushes it to pieces. The instrument has two movable blades at the extremity introduced into the bladder, and these are brought together to crush the stone by means of a powerful screw. This operation is only applicable where the bladder is not irritable, where the canal of the urethra is of good size, and the stone small. It is inapplicable to children, but this is the less to be regretted, because there is perhaps no surgical operation more generally successful than that of lithotomy in children. In lithotry care must be taken that no portions of the stone are left in the bladder, as such fragments are almost certain to form the nuclei of fresh concretions.

Lithuania, lith'-ū'-ā-ni-a, Russia, a historic grand-duchy of 60,000 square miles, united in 1569 to Poland, and since the dismemberment of that kingdom in 1773, 1793, and 1795, forming the Russian governments of Mohilev, Vitebsk, Minsk, Vilna, and Grodno, and portions of the Prussian province of Gumbinnen and East Prussia. The Lithuanians, who are of Lettish origin (see LIVONIA), were in the 11th century tributary to Russia, but they made themselves independent when Russia was divided by the troubles under the successors of Vladimir. Ringold, in 1235, bore the title of grand-duke, and under his successors the whole of Russian Lithuania became independent. Vladislaus Jagello, by his marriage with the Polish queen Hedwig, united Lithuania and the conquered Russian provinces with Poland.

Lititz, lit'its, Pa., borough, in Lancaster County; on the Reading & Columbia railroad;

LITMUS — LITTLE FALLS

about 28 miles southeast of Harrisburg, and 8 miles north of Lancaster. The first permanent settlement was made in 1757 by Moravians. Some of the United Brethren had formerly lived in Bohemia and they named the place after their old home. They showed their loyalty to their new country by providing shelter, food, and care for wounded soldiers of the Revolutionary War. The graves of some of the early patriots are still pointed out. Lititz is situated in a region where there are many good farms, but its chief industries are in manufacturing. The principal manufactures are corn-starch, knit-goods, cocoa, chocolate, cigars, and some dairy products. The mineral springs are noted and much frequented. The borough is the seat of Linden Hall Seminary, established in 1794. Pop. (1900) 1,637. Consult: Mombert, 'History of Lancaster County, Pa.'; Moravian Historical Society Records.

Lit'mus, or *Lacmus*, is a blue pigment obtained from any lichen which yields archil. (See *LICHEN*, *Fungi*) The plant, bruised between stones, is exposed to the air for several weeks, and moistened with some liquid containing ammonia, lime and potashes being also added. Fermentation sets in, the lichen becomes red and finally blue, and when it has acquired the proper tint, chalk or sulphate of lime is added, and the soft paste is made into square cakes by pressure in molds, and the cakes are then dried. Litmus is complex in nature; it contains several coloring matters of definite composition, which can be separated by the use of glacial acetic acid and absolute alcohol.

Lit'olff, Henry Charles, European composer and pianist: b London 6 Feb. 1818; d. Paris 6 Aug. 1891. He studied pianoforte playing under Moscheles, and made his first public appearance as a pianist at the Covent Garden Theatre, London, in 1832. At 17 he went to France and for some time lived a wandering life traveling in France, Holland and Germany, giving concerts. In 1851 he settled in Brunswick, married the widow of the music-publisher Meyer, and took control of the business; later he transferred the management of affairs to his adopted son, who began the publishing of cheap editions of classical music. In 1860 he moved to Paris, and married the daughter of the Count de la Rochefoucauld. His compositions include piano pieces (including the 'Spinnlied'); symphony concertos; and the operas 'Héloïse et Abelard'; 'Die Braut von Kynast'; 'Les Templiers,' and 'King Lear.' As a pianist he showed feeling and brilliancy of execution, but was uneven, and sometimes inaccurate.

Litop'terna, a South American perissodactyl of the Tertiary Period, related to the ancestors of the horse. See *HORSE*, *Fossil*.

Litor'i'na. See *PERIWINKLE*.

Litre, *lē-tēr*, or *Liter*, the French standard measure of capacity in the decimal system. It is a cube, each side of which measures 3.937 inches, and it contains 61.028 cubic inches, or 2.113 pints. See also *METRIC SYSTEM*.

Littell, *lē-tēl'*, *Eliakim*, American publisher: b. Burlington, N. J., 2 Jan. 1797; d. Brookline, Mass., 17 May 1870. He learned the printer's trade, and in 1819 established at Philadelphia a literary periodical, the 'National Recorder,' the name of which was changed in 1821

to the 'Saturday Magazine.' In 1822 he began to publish a monthly, the 'Museum of Foreign Literature and Science,' giving selections from the best periodical literature of Europe. In 1844 he started in Boston 'Littell's Living Age,' a weekly literary eclectic periodical which is still continued.

Little, James Stanley, English writer on literature and art: b. Herne Hill, Surrey. He has lectured in England, on South Africa and imperial federation, edited 'African Review' 1895-7, and 1901-2, and has published 'A World Empire' (1879); ('South Africa') (1884); ('What is Art?') (1884); ('The United States of Britain') (1887); ('A Vision of Empire') (1889); ('The Progress of the British Empire in the Century') (19th Century Series) (1901); etc.

Little Blue Creek, a small stream in Jackson County in the western part of Missouri. A contest occurred, in 1864, on the banks of this stream, between Federal troops under General Curtis and Confederate troops under General Sterling Price. The contest lasted several hours, when the Confederates fell back on Big Blue Creek, in the same county, and made a strong resistance. The Union cavalry, under General Pleasanton, finally routed the Confederates, who retreated into Arkansas.

Little Colorado, a river which has its rise in the western part of New Mexico, and flows southwest into Arizona, where the course changes northwest to its junction with the Colorado River. The amount of water is sometimes large, but again the river resembles a chain of small lakes or ponds, with dry or nearly dry river beds in many places. The river is about 230 miles long. It flows a little south of the southern boundary of the Navajo Indian Reservation, around the region where many "Cliff Dwellers" once lived in Arizona, and on through arid wastes and among low mountains to near the Colorado, where it enters a deep cañon, through which its waters flow into the Colorado just at Marble Cañon.

Little Corporal, The, a name bestowed upon Napoleon by his admiring soldiery after the battle of Lodi, in affectionate allusion to his small stature.

Little Dorrit, a novel by Charles Dickens (q.v.) published in 1856. There is but a slight plot to the story, which contains more than 50 characters.

Little E'gret, any of several small, white herons. See *EGRET*; *HERON*.

Little Falls, Minn., city and county-seat of Morrison County; on the Mississippi River, and on the Northern Pacific railroad; about 100 miles northwest of St. Paul. The place was settled in 1856, and in 1889 was incorporated. A dam across the river aids in furnishing extensive water-power. It is situated in an agricultural and lumbering region. Its chief manufactures are flour, lumber, machine-shop products, paper, bricks, beer, and dairy products. It is the commercial centre for a large part of Morrison and adjoining counties. It has a fine court-house, Saint Gabriel's Hospital, Saint Otto's Orphan Asylum, a city library, and several good school buildings. Pop. (1890) 2,354; (1900) 5,774.

Little Falls, N. Y., city, in Herkimer County; on the Mohawk River and the Erie

LITTLE GIANT—LITTLE ROCK

Canal, and on the West Shore and the New York Central & H. R. R.R.'s; just midway between Albany and Syracuse. Where the city is now was once the site of an Indian village, and was visited in the 17th century by missionaries. A white settlement was made here about 1770 or a few years later. In 1782 this settlement was destroyed by Indians and Tories, and no successful efforts were made to rebuild until 1790, when a colony of Germans took possession. The place was incorporated as a village in 1811; the incorporation was changed in 1827. It became a city in 1895. The city gets its name from the falls, or series of cascades in the river, which descends 45 feet in less than a mile. General Herkimer, a Revolutionary officer, is buried in a cemetery near the city.

Little Falls is situated in a grazing region noted for its dairy products; but the city is noted for its manufactures. The country around is rolling and is diversified by many low hills, but along the Mohawk, where Little Falls stands and in the vicinity, there are peculiar rock formations. The chief manufactures are knit-goods, paper, carriages, bicycles, leather, knitting machinery, foundry and creamery products, and book-cases. There are about 2,500 employees in the manufacturing establishments. The two banks have a combined capital of \$350,000; the annual amount of business is about \$2,750,000. The city has a number of fine church buildings, a city hospital, a public school library, an excellent high school, public and parish schools, and a number of fine public and private buildings. Pop. (1890) 8,783; (1900) 10,381.

Little Giant, The, a familiar name applied to Stephen A. Douglas (q.v.) by his political admirers in allusion to his small stature and great intellectual capacity.

Little John, one of the outlaw comrades of Robin Hood. He was famed for his strength and was the only one of the company who could approach Robin Hood in skilful handling of the bow. By some authorities his name is supposed to have been John Nailor.

Little Kanawha, kā-nā'wā, a river which has its rise in the central part of West Virginia, flows west and northwest, and enters the Ohio River at Parkersburg. It is about 100 miles long, has considerable rapidity in the mountain section, and is of benefit as a route for the transportation of the oil and lumber of that portion of the States through which the river flows. It has been made navigable as far as Burning Springs, about 40 miles from Parkersburg.

Little Lord Fauntleroy, a popular story for children by Mrs. Frances Hodgson Burnett, originally published in 1885 as a serial in the magazine "Saint Nicholas."

Little Mac, a nickname applied by the soldiers of the Union army during the Civil War to General George B. McClellan (q.v.).

Little Nell, a child character in the novel "Old Curiosity Shop," by Charles Dickens. She was reared amid vice and crime, yet preserved a beautiful purity of character.

Little Phil, a nickname given by his soldiers to General Philip H. Sheridan (q.v.) during the Civil War.

Little Red Riding Hood, a well-known fairy tale which first appeared in Paris in 1697, in a collection of tales by Charles Perrault.

Little Rock, Ark., capital of the State, the seat of Pulaski County, and the largest city in the State; on the St. Louis, I. M. & S., the Rock Island, and the St. Louis S. railway systems; 133 miles west of Memphis, 346 miles southwest of St. Louis, 165 miles west of Fort Smith, and 145 miles northwest of Texarkana. Little Rock is situated on both banks of the Arkansas River, and takes its name from the rocky promontory which rises on the south bank some 50 feet above the river, now used as one of the abutments of one of the four bridges which span the river. This rock is the first seen in ascending the river, and was called the Little Rock, in contradistinction to the bold precipice, about ten times higher, which rises some three miles above upon the opposite bank, and called the Big Rock. This commanding eminence is now the site of an army post. While the eastern border of the city touches rich alluvial cotton lands, without rocks and subject to a high state of cultivation, its western border reaches to the foot-hills of the Ozark Mountains. It is situated near lat. 35° and lon. 92°, almost at the centre of the State. The Arkansas River is navigable up to this point during the major portion of the year for large steamboats, while smaller vessels may as far up as Fort Smith.

Trade and Commerce.—The growth of the commerce of Little Rock has been gradual but steady. The total business for 1902 is estimated at \$50,000,000, a large portion of which consisted of cotton and its by-products. During the season of 1901-2 Little Rock shipped 246,675 bales of cotton. The total freight traffic for 1902 employed 83,405 cars. The real estate transactions during the same year aggregated \$2,495,882. The postal receipts for the fiscal year ending 30 June 1903, totaled \$116,036. The Board of Trade, the Retail Grocers' Association, and the Merchants' Freight Bureau are organs for concert of action among business men.

Manufactures.—The largest single industry is the manufacture of cottonseed-oil. There are four mills, which shipped during the season of 1901-2, 727 cars of oil, 1858 cars of meal, and 473 cars of hulls. Of other industries, besides domestic and jobbing shops such as clothing, food, plumbing, etc., the principal are foundries, railway shops, a cotton mill, ice and printing plants, 4 compress companies, beer and bottling works, and wagon shops. The census report shows that in 1900 the city contained 171 manufacturing establishments with \$3,434,393 capital, employing 2,751 persons, paying \$1,384,722 in wages, and \$1,900,081 for materials, and having a total output of \$4,723,118.

Banks.—On 1 Nov. 1903, there were three national banks and 12 State and savings banks, with a capital stock of \$1,875,000 and surplus of \$563,410, and deposits amounting to \$6,211,117. The local bank clearings for the year 1902 aggregated \$48,521,981.99. Besides these, there are 13 building and loan associations, all local, with aggregate stock amounting to \$8,335,010, and loans in force aggregating \$2,605,316.

Government and Finances.—All municipal corporations in Arkansas are governed by general laws, and not by special charter. The mayor, treasurer, police judge, city clerk, and

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city attorney, as well as the aldermen, are elected biennially. The city council is composed of the mayor and 16 aldermen, two of whom are elected from each of the eight wards by the voters of the entire city, and are required to reside in their several wards. The administrative officers are partly appointed by the mayor and partly elected by the council. The ordinary expenses of the city for the year 1902, not including the schools, aggregated about \$180,000, of which \$37,225 were expended for the police department, and \$36,504 for the fire department. The net bonded indebtedness is \$78,000. There is a floating indebtedness of \$11,000, a judgment debt of \$21,000, and a disputed claim of some \$60,000. The assessed valuation of real and personal property in 1902, on a basis of about 40 per cent of the full value, was \$15,971,236. The rate of taxation was as follows: State 5 $\frac{3}{4}$ mills; county, 9 $\frac{1}{4}$ mills; city 6 mills; school district, 5 mills, making a total of 26 mills. Counties and cities and towns are prohibited from levying taxes in excess of five mills on the dollar, except that they may levy a tax not exceeding five mills on the dollar to pay indebtedness existing at the time of the ratification of the State constitution (1874), and that counties may levy a road mill tax not exceeding three mills. Besides the revenue derived from the tax on real and personal property, the city received in 1902 from police court fines the sum of \$43,734.05; from general licenses, \$39,654.40; from the vehicle license, \$11,238.00; from miscellaneous sources \$8,691.79.

Churches and Charitable Institutions.—Little Rock is a city of numerous churches. There were in 1902, 73 churches and chapels (of which 37 were colored) with a total membership of 13,600; the two strongest denominations being the Methodist and the Baptist. It is the seat of Roman Catholic and Protestant Episcopal cathedrals, Saint Andrew's and Trinity. The former, at the corner of Seventh and Louisiana streets, is a noble edifice built of native granite, the most striking piece of architecture in the city. Other notable buildings are Christ Church (P. E.), the Eighth Street Methodist, the German Evangelical Lutheran, the First Presbyterian Churches and the Jewish Temple. Of the charitable institutions the more notable are the county and city hospitals, Saint Vincent's Infirmary, conducted by the Sisters of Mercy, the Children's Home, the Methodist Orphanage, the Jane Kellogg Home for Aged Women, and the Home for Aged Colored Women.

Buildings, Parks and Suburbs.—Little Rock is noted for the beauty of its homes. The profusion of its flowers have won for the city the name of "the City of Roses." All of the State's public institutions except the University of Arkansas at Fayetteville and the Branch Normal Institute for colored youth at Pine Bluff are located here. These include the State House, the School for the Blind, the Deaf-Mute Institute, the Lunatic Asylum, and the State Penitentiary. The State is erecting a new Capitol, to be built of Arkansas marble. Other public buildings of note are the Pulaski County Court house, constructed of granite quarried in the vicinity, the Custom House and Post Office, and the Board of Trade building. Of club houses are the Country Club, the Athletic Association, the Quapaw Club and the Elks' Lodge, social organizations, Concordia Association, a Jewish

club, the Masonic Temple, and the Albert Pike Consistory. The City Park, consisting of 35 acres of ground, is situated in the heart of the residence portion of the city, and is tastefully laid out in walks and drives, and well kept up. The Arkansas River is crossed by three railroad bridges and a free bridge erected by Pulaski County at an expense of nearly \$400,000, uniting the northern and southern portions of the city. There are two incorporated suburbs of the city, namely, Baring Cross, a thriving town of 800 inhabitants lying north of the Arkansas River and west of the city limits, and North Little Rock, a small town lying north of the river and of the city. A new suburb on Pulaski Heights, a picturesque hill overlooking the city, has recently been brought into prominence by the extension of the street car system, and promises to become fashionable for residences. Mount Holly, the oldest cemetery in the city, is beautifully adorned with shrubs and flowers, and has many fine monuments. Other cemeteries are Oakland, the Jewish, the Catholic, the National, the Confederate, and the Colored. The city is abundantly supplied with pure water obtained from the Arkansas River. There are two reservoirs with a storage capacity of 11,000,000 gallons, with an average daily consumption of 3,250,000 gallons. There are 65 miles of water mains in the city.

The streets are laid out with regularity. The principal retail thoroughfares are Main and Markham, the former running north and south and at right angles to the latter. There are within the city 239.61 miles of opened streets, of which 3 $\frac{1}{2}$ are paved with brick, granite and asphalt, and 8 miles with Telford and macadam pavement; 47.6 are graveled, and 105 are graded. The city has entered upon a new era as to the improvement of its streets. In addition to a tax of 3 mills collected exclusively for the improvement of highways, the city collects for the same purpose a vehicle tax. The recent discovery of asphalt beds in Arkansas is expected to lead to great improvement in road making in the city. Perhaps no other city of the same size will enjoy better street railway facilities than Little Rock when the projected improvements are added. The street railway company is now operating 25 miles of line within the city limits. The extensions to Pulaski Heights and on the north side of the river, when completed, will add 6.5 miles.

Education.—The single school district of Little Rock is a corporation distinct from the city, its territory including only that portion of the city which is south of the river. In 1902 it had ten schools, with 14 buildings, of which four schools with five buildings were for the colored children, 93 teachers, and an enrollment of 5,140, of whom 1,670 were colored. The school census for the same year showed a total of 11,535 who were entitled to attend the schools, of which number 4,407 were colored. This school district is perhaps unique in possessing a commodious and well furnished school board building, with rooms for meetings of the board of directors, for the superintendent and secretary, and for the teachers' meetings. The North Little Rock school district, including so much of the city as lies north of the river, had in 1902 five school buildings, two of which were for colored children, 15 teachers, and an attendance of 885. The school census showed that

LITTLE ROCK—LITTLE TURTLE

2,600 were entitled to attend the public schools in that district. Besides the public schools, there are private and parochial schools. For higher education, the University of Arkansas, the main departments and buildings of which are located at Fayetteville, has branch schools of law and medicine located here. Besides these are the Arkansas Military Academy, a military training school for boys, Maddox Seminary for young ladies, and the Philander Smith College for colored youth.

History.—When the territory now known as Arkansas passed to the United States in 1803, the site of the future capital was an unbroken wilderness. By the act of Congress of 2 March 1819, the seat of government of the newly created territory was fixed at the Post of Arkansas on the Arkansas River some 30 miles above its confluence with the Mississippi. On 24 Oct. 1820, an act was passed removing the capital to Little Rock. It has been aptly said that so manifest was the destiny of the future city that it was made the seat of government before it had become a town. A post-office was established on 10 April 1820. It was incorporated as a town 27 Oct. 1825. It is said that the inhabitants numbered only 450 in 1830. On 2 Nov. 1835, it was, by special act, incorporated as a city. When the momentous question of secession arose in 1861, a convention was called by the legislature to meet at Little Rock to discuss the subject. It met on 4 March, and, after considering the matter, adjourned without definite action on 21 March, subject to recall. On 6 May 1861, when war was already flagrant, the convention, being recalled, with only one dissenting vote, adopted an ordinance dissolving the union existing between the State of Arkansas and those united with her under the compact entitled, "The Constitution of the United States of America." On 10 Sept. 1863, Little Rock was captured by the Northern army under Gen. Steele, and remained in possession of the Federal forces during the remainder of the war. The unexpected increase in the population between the years 1860 and 1870, covering the period of the Civil War, may perhaps be attributed to the fact that during that period of disintegration society was forming new associations. The growth of the city since 1880 has been constant and rapid.

Newspapers.—The city has three daily and several weekly newspapers. The Arkansas *Gazette* was originally founded by Wm. E. Woodruff, Sr., at the Post of Arkansas in 1819, and has been continuously published ever since under the same name, except when it was suspended for a short time during the war. When the seat of government was removed to Little Rock in 1820, it followed in the wake of the government, and issued its first number at the new capital on 29 Dec. 1821. Its subsequent growth has been closely linked with that of the city.

Population.—The population of Little Rock in 1850 was 2,167; (1860) 3,727; (1870) 12,380; (1880) 13,138; (1890) 25,874; (1900) 38,307, of whom 23,500 were white, and 14,717 were colored. Of these 38,307 inhabitants, 2,099 were foreign born, while 36,307 were native. In 1904, population was 55,000. T. D. CRAWFORD,

Supreme Court Reporter, Little Rock, Ark.

Little Rock, Capture of. The State authorities of Arkansas seized the United States

arsenal at Little Rock 8 Feb. 1861, and until 10 Sept. 1863 the city remained in Confederate occupation. After the fall of Vicksburg and Port Hudson, 4 and 8 July 1863, Gen. F. Steele was ordered from Vicksburg to Helena and directed to form a junction with Gen. Davidson, who was moving south from Pilot Knob, Mo., break up Sterling Price's army, and occupy Little Rock. Steele arrived at Helena 31 July and organized his expedition, finding at that place two divisions of infantry, a brigade of cavalry, and 39 guns; in all, about 7,000 men. On 5 August he marched for Devall's Bluff on White River, reached it without incident, and there was joined by Davidson with 6,000 cavalry and three batteries, making his force about 13,000 men and 57 guns. A few days later he was joined by a brigade which raised his aggregate to over 14,000, of whom 10,500 were effective, many being sick. August 24 Davidson's cavalry advance skirmished with Marmaduke's cavalry up to and through Brownsville and up to his intrenchments at Bayou Meto. Davidson fell back to Brownsville, where, 2 September, Steele joined him, and concentrated all his available force. The position on the Bayou Meto, 12 miles from Little Rock, was flanked, and on the 7th Steele reached the Arkansas River near Ashley's Mills, where Davidson's cavalry had a sharp skirmish and drove the Confederates across the river. Steele repaired the main road back to Bayou Meto, and on the 10th Davidson crossed to the south side of the river by a pontoon bridge and marched on Little Rock, but ten miles distant, Steele marching along the north bank. The city was defended by Sterling Price with about 7,700 men, of whom 6,500 were intrenched on the north side of the Arkansas, and about 1,200 on the south side, on the line of the Bayou Fourche, about five miles from the city. Davidson moved directly on the city, without much opposition until he reached Bayou Fourche, where he found Marmaduke's cavalry, dismounted, a brigade of infantry, and two batteries, all drawn up to oppose him. Davidson attacked on two roads, driving the Confederates back; Steele, who had marched abreast of him on the opposite side of the river, opened an enfilading artillery fire; and Marmaduke fell back through the city, closely followed by Davidson's cavalry. Price had withdrawn from the north bank of the river when he learned that Davidson had turned the position, and evacuated the city at 5 P.M., retreating to Arkadelphia. Steele's cavalry followed Marmaduke's cavalry for a day, and returned to Little Rock on the 12th. At 7 P.M. the city was formally surrendered to Davidson by the civil authorities. Price burned eight steamers, one of them a powerful gunboat, but the arsenal was saved. Steele reported a loss of 137 killed, wounded, and missing; Price reported a total loss of 64. Consult: "Official Records," Vol. XXII.; Lossing, "History of the Civil War," Vol. II.; The Century Company's "Battles and Leaders of the Civil War," Vol. III.

E. A. CARMAN.

Little Turtle, an Indian chief of the Miami Nation, one of those who signed the Treaty of Greenville in 1795. He visited President Washington in Philadelphia in 1797. He

LITTLE WOMEN — LITTRROW

was celebrated for his courage, ability and shrewdness. With his native forces he defeated General Harrner on the Miami River in 1790, and General St. Clair in 1791.

Little Women, a popular story for children by Louisa M. Alcott (q.v.), published in 1868.

Lit'tlefield, Walter, American journalist: b. Boston 17 March 1867. He was educated at Harvard and has been since 1897 on the editorial staff of the *New York Times*. He is the American correspondent of *Le Siècle*, Paris, and the author of 'The Truth about Dreyfus.' He has edited 'The Letters of an Innocent Man (Dreyfus)' (1898), and other works.

Lit'tleholes, George Washington, American hydrographic engineer: b. Schuylkill County, Pa., 14 Oct. 1860. He was graduated from the United States Naval Academy in 1883. He is an associate editor of the 'International Journal of Terrestrial Magnetism,' and has published, 'The Development of Great Circle Sailing'; 'The Methods and Results of the Survey of Lower California'; 'The Magnetic Dip or Inclination'; 'The Azimuths of Celestial Bodies'; and other works, all published by the United States Navy Department.

Lit'tlejohn, Abram Newkirk, American Protestant Episcopal bishop: b. Florida, Montgomery County, N. Y., 13 Dec. 1824; d. Williamstown, Mass., 3 Aug. 1901. He was graduated at Union College in 1845 and took orders in the Episcopal Church in 1850. He was rector of St. Paul's, New Haven, Conn., 1851-60, and of Holy Trinity Church, Brooklyn, N. Y., 1860-9. He was made bishop of Long Island in 1869, and from 1874 was in charge of American Episcopal churches on the continent of Europe. He wrote 'Philosophy of Religion'; 'The Christian Ministry'; etc.

Littlejohn, John Martin, American physiologist and osteopathist: b. Glasgow, Scotland, 1867. He was graduated from the University of Glasgow, afterward studied theology and was ordained in 1886. He was a tutor in Glasgow University, principal of Rosemont College 1890, of Amity College, Iowa, 1894-7, and has been president of the American School of Osteopathy, Kirksville, Mo., from 1900, and professor there from 1897. He has published 'The Political Theory of the Schoolmen and Grotius' (1894); 'Text Book on Physiology' (1898); 'Lectures on Psycho-Pathology' (1900).

Lit'tleton, or Lyttleton, Sir Thomas, English jurist: b. Frankley, Worcestershire, 1402; d. there 23 Aug. 1481. He was a student at the Inner Temple, sheriff in 1447, recorder of Coventry in 1450, and in 1453 was made sergeant-at-law. After holding several other legal appointments he became justice of the common pleas in 1466. He was created a knight of the Bath in 1475. His treatise on 'Tenures,' with the well-known commentary by Sir Edward Coke, was long the standard authority on the English law of real property. It was written in legal French, and first published at London about 1480. There are many subsequent editions.

Littleton, N. H., town, in Grafton County, on the Ammonoosuc River, and on the Boston & Maine railroad. When it was first settled in 1770, it was called Apthrop. When it was in-

corporated, in 1784, the name was changed to Littleton. It is in a section of the State noted for its beautiful scenery and cool summer climate. The river furnishes considerable water-power; and the town has several manufactures. Its chief manufactures are shoes, gloves, wagons and carriages, whetstones, bobbins, stereoscopic views, wooden ware, and furniture. It has a good public library; the building is a gift from Andrew Carnegie. The government of the town is administered by means of the annual town meeting. Pop. (1900) 4,066.

Littoral Deposits. See SANDSTONE.

Littré, Maximilien Paul Emile, mäk-sil-mil-i-öñ pôl ä-mé'l le-trä, French philosopher: b. Paris 1 Feb. 1801; d. there 2 June 1881. After completing his course at school his study of medicine was interrupted by the death of his father. He then engaged in teaching for a livelihood, took an active part in the revolution of 1830, and soon after was invited by Armand Carrel, editor of the 'National,' to write for that paper. In 1839 he published the first volume of an edition of Hippocrates in the original, with a French translation and copious notes. This work, in 10 volumes, secured his admission to the Académie des Inscriptions et Belles-Lettres. He translated Strauss's 'Leben Jesu,' and having adopted Comtist principles, wrote an able and lucid synopsis of them in his 'De la Philosophie Positive' (1845). In 1854 he was appointed editor of the 'Journal des Savants' and in 1863 commenced the publication of his great work, the 'Dictionnaire de la Langue française,' which has been called the best dictionary of any living language yet published. This was finished in 1873, two years previous to which Littré had been admitted into the Académie Française. Another important work of his was an edition of Pliny's 'Natural History' with a translation and notes. During the siege of Paris he retired with his family to Bordeaux, and was appointed professor of history and geography in the polytechnic school there. He was afterward summoned to Versailles to take his seat in the senate, having been chosen by the department of the Seine. He became a life senator in 1874. Among Littré's other works are 'Application de la Philosophie Positive au Gouvernement des Sociétés' (1849); 'Conservation, Révolution et Positivisme' (1852); 'Paroles de Philosophie Positive' (1859); 'Histoire de la Langue française' (1862); 'Auguste Comte et la Philosophie Positive' (1863); 'Etudes sur les Barbares et le Moyen Age' (1867); 'Médecine et Médecins' (1871); and 'Littérature et Histoire' (1875).

Lit'trow, Joseph Johann von, Austrian astronomer: b. Bischof-Teinitz, Bohemia, 13 March 1781; d. Vienna 30 Nov. 1840. In 1807 he obtained the chair of astronomy in the University of Cracow, and in 1810 accepted a similar chair in Kasan, where he founded the observatory. He became in 1816 joint director of the observatory of Buda, and from this he removed in 1819 to become director of the observatory of Vienna. He completely reorganized this establishment, and in his lectures yearly attracted a numerous audience, not only of ordinary students, but of unprofessional persons, many of them strangers from abroad. His writings, chiefly on mathematical and astronomical subjects, are numerous, and have generally had

a very extensive circulation. By far the most popular of all is his 'Die Wunder des Himmels,' of which the 8th edition was published (1895-7). It ranks as one of the best works of astronomy for the use of general readers.

Littrow, Karl von, Austrian astronomer: b. Kasan, Russia, 18 July 1811; d. Venice 16 Nov. 1877. He was a son of Johann Littrow (q.v.) whom he assisted in the Vienna observatory from 1831, and succeeding him as director in 1842. He edited the works of his father, adding considerably to 'Die Wunder des Himmels,' and was the author of 'Populäre Geometrie' (1839); 'Verzeichnis der geographischen Ortsbestimmungen' (1844-6).

Liturgy (Greek *λειτουργία* means a public service; used at Athens to mean a public service which the richer citizens discharged at their own expense.) The Septuagint translators used the Greek word *leitourgos* for that service of God in the Sanctuary. In the Hebrew it had various kindred meanings; in the Old Testament it usually denotes the service of a Jewish priest, but in the New Testament it is used of any service rendered to God. In the 4th century, the word as applied to priestly ministrations was generally recognized; and while it continued in use as meaning any solemn service, it was applied especially to the Eucharistic service. It is in this sense that the word is used by the Greek Church when they say "Divine liturgy."

The records extant which show the exact liturgy of the Christian Church in the 1st century are more the allusions found in documents of the 2d century. From the year 150 there are numerous proofs to show the existence of a fixed order and fixed words for the service of the mass or for the Eucharistic service. This service or liturgy was not made just when mentioned by Cyprian, and in 138 by Justin, and many others who committed to writing the order of the services or the liturgy. But there is not sufficient proof to warrant the assertion that there was any entire written liturgy before the 4th century. As the liturgies exist to-day they may be divided into five groups or families of liturgies, distinguished from each other chiefly, though not entirely, by the different arrangement of their parts. Three of the groups are Oriental and two are Western. They are: (1) The West Syrian Group, which includes the Liturgies of Saint James, Saint Basil, Saint Chrysostom, and that of Armenia. In this group the intercession for the living and the dead is placed after the invocation of the Holy Spirit, which in Oriental liturgies follows the consecration.

(2) The Alexandrian Group, which includes three Greek liturgies; Saint Mark, Saint Basil, and Saint Gregory, also the Coptic liturgies. This group is characterized by the "Great Intercession" for the living and the dead being placed in the midst of the Preface.

(3) The East Syrian Group, includes the liturgies in the Syriac language as used by those who belong to the Roman Catholic Church. In this group the "general intercession" is placed between the words of institution and the invocation of the Holy Spirit.

(4) The Liturgies of Gaul and Spain. In this group the "Great Intercession" comes just after the offertory, though the Mozarabic liturgy

has a memento of the living before the Pater Noster.

(5) Gallican Liturgy. In this the intercession is divided, that of the living is before consecration, and that of the dead after consecration.

That part of the "Liturgy of the Mass" called the "Canon" is very ancient, and existed about as at present since the time of the Apostles (see MASS; MISSAL). The liturgy of the Church of England is derived from the Ephesine original through the ancient Gallican liturgy which was brought to France by Greek missionaries, who were accustomed to use the form known as the liturgy of Saint John. There is no invocation of the Holy Spirit in the present English form, although the Protestant Episcopal Church has restored the invocation, like the Scottish Episcopal Church. There is, however, no ritual element wanting in these two English forms whether they be compared with the Greek or Latin liturgies. The liturgy in use in the Protestant Episcopal Church more nearly resembles the Gallican liturgy than any other group, but in some respects there is a difference in arrangement, and also in meaning. There is no intercession for the dead, and the intercession for the living comes before the Communion.

There is a growing tendency among many of the Protestant Churches and denominations to adopt liturgical services.

Bibliography: Tertullian, 'De Corona'; Cyprian, 'Epistle'; Report of Council in Trullo; Probst, 'Liturgie der drei ersten Jahrhunderte,' who claims that there was a written liturgy before 150; Hammond, 'Ancient Liturgies'; Smith and Cheatum, 'Liturgies.'

Lituus, (1) a crooked staff, represented in works of art as borne by the ancient Roman augurs in their divinations. It was like a crozier in shape. (2) A trumpet, having a mouth which curved upward, and which was used by the Roman priests and cavalry. (3) In geometry, a spiral, of which the characteristic property is that the square of any two radii vectores are reciprocally proportional to the angles which they respectively make with a certain line given in position, and which is an asymptote to the spiral.

Liu-kuo, lē-oo'kē-oo', or **Loo-choo Islands**, Japan, a chain of 37 islands, mostly small, forming an integral part of the empire, and extending irregularly in a southwestern direction between Kiu-shiu and Formosa. The islands were conquered by the Prince of Satsuma in 1609. They constitute the Japanese prefecture of Okinawa, with an area of 1,863 square miles; pop. 160,000. Oshima and Okinawa are the only islands of considerable size. Capital, Shiuri in Okinawa. See JAPAN.

Liu-Kun-Yi, Chinese statesman: b. Hunan about 1820; d. Nanking 6 Oct. 1902. He received a military education, and though not a scholar held high official positions. In 1861 he commanded one of the armies raised to oppose the Taiping rebels, and defeated them by a series of successful maneuvers. At the time of the Boxer outbreak he was viceroy of Nanking, the so-called "southern capital" of China, and in spite of the vigorous anti-foreign agitation in his own province and the hostile attitude of the Imperial Government at Peking, he refused to join the anti-foreign movement, and used his foreign-

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drilled troops to suppress all Boxer demonstrations. In this he was supported by the Viceroy of Wuchang, and these two viceroys prevented the spread of the Boxer movement to the valley of the Yang-tse-Kiang, and were consequently influential in protecting Chinese interests in the subsequent peace negotiations.

Liut Prant, li-oot' pránt, a king of the Lombards (q.v.).

Livadia, liv-ä-dé'a, or **Lebadea**, Greece, a town on the Hercyna, 52 miles northwest of Athens. It is defended by a castle; and has manufactures of cotton goods, and a trade in small articles of raw produce. Pop. 6,500. Higher up the river, in a narrow gorge, is the site of the ancient Hieron, or cave of Trophonius, and the fountains of Lethe and Mnemosyne.

Live-for-ever, or **Garden Orpine**, a small cultivated stonecrop, *Sedum telephium*. See STONECROP.

Live Oak, a species of evergreen oak found growing in various parts of the United States, Central America, and Cuba. See OAK.

Live Stock, Derivation of. The domestic animals of the world have all been derived from wild stock, from which they differ in a greater or less degree, according as the need and variety of their services have called for changes in the course of their development from original types. In some cases the original stock has been completely lost, so that it can only be inferred or remembered by tradition. In others it is perfectly well known from what natural species the domestic races in question have descended, and this animal may still be found in a wild state.

The cattle of the world are the product mainly of three lines of descent. First, that which gave rise to the ordinary breeds known in Europe, America, and all those parts of the world that have been colonized by Europeans; second, the Indian humped cattle; and third, the varieties of the Asiatic buffalo. The last named are merely domesticated races of the existing wild buffalo of southern Asia, which are adapted to swampy lands and have been spread throughout that part of the world inhabited by Malays, and also carried to Egypt, the Senegal region and some other territories.

The common cattle of the United States have come down to us apparently along two lines of descent, which are continually mingled, especially in the interior parts of the country. The cattle of New England and the eastern half of the country generally, were brought primarily, and have since been supplemented by occasional importations, from Great Britain and the Netherlands. This stock owes its origin to the domestication following the Roman conquest of western Europe of two species of wild oxen which roamed the forests of the continent of Europe, and were found numerously there by Cesar and his army. One of these was a long-horned kind which seems also to have been indigenous to the British Isles. The other was apparently more southerly and easterly in its distribution.

Our horses are the highly varied product of the domestication of a species of horse which became entirely extinct anterior to any records. Its home, no doubt, was in the highlands of central Asia, and it was probably a small, shaggy, big-headed, dun-colored animal, more nearly

resembling the Asiatic wild ass or kiang than anything else now known to us. It is possible that a separate pony was native to the forests of Europe, and that its blood may have been joined with that of the Asiatic horse in the formation of our present race, but of this we cannot be sure.

Sheep also are of unknown origin. It is probable, however, that they represent a combination of several species natives of the mountains of central Asia, some or all of which may be living but unrecognizable. The ordinary goat we know to be descended from the wild goat of western Asia, with possible admixture in the case of the Angora goats of the markhor or some other Himalayan species.

Swine are the domesticated races in Europe of the wild boar, which is still extant; and in the Orient of one or more local species of wild swine that still exist there in their native state.

Poultry are more easily traced than most of the larger domesticated animals. All of our barn-yard hens and chickens, curiously diversified as they have become, are the descendants of the jungle-cock of India, still to be shot among the foot-hills of the Himalayas. Similarly the ancestry of the peafowl, guineafowl and turkeys, is found in species of birds which we still know in a wild condition. Ducks and geese are of more diverse origin, but may be traced in most cases to the wild ducks and geese still prevalent in many parts of Europe and America, or else to certain well-known species of the Orient.

Liver. The liver is the largest glandular organ of the body. In man it is situated on the right side of the abdominal cavity immediately beneath the diaphragm. Its weight in the adult is approximately from 3 to 4 pounds, and its size is roughly indicated by the following measurements: greatest diameter about 12 inches, anteroposterior diameter about 7 inches, thickness at different parts from 1 to 3 inches. The organ is divided into five lobes, of which the right and left are the principal ones; the former comprising the greatest part of the bulk of the entire organ. On the under surface may be seen a square lobe lying anteriorly between the right and left lobes, and known as the quadrate lobe. In a similar position between the right and left lobes at the posterior part of the organ is the Spigelian lobe, while a bridge-like lobe extending from the latter to the right lobe is known as the caudate lobe. The upper surface of the right and left lobes is convex and fits into the arch of the diaphragm. The lower surface of the organ is more or less concave and is divided by five fissures. Of these a longitudinal furrow extends from the anterior to the posterior border of the organ separating the right from the left lobe; a transverse fissure extends at right angles from this at a point somewhat nearer the posterior than the anterior surface; it divides the longitudinal fissure into an umbilical fissure in front (so-called on account of its lodging the umbilical vein in the foetus) and the fissure of the ductus venosus behind (on account of its lodging the ductus venosus in the foetus). Between the lobus Spigelii and the right lobe of the liver is the fissure of the inferior vena cava, lodging that vein, while at the anterior edge of the organ at the side of the quadrate lobe is a fissure which accommodates the gall-bladder. The transverse fissure is the most important, as it serves for the

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entrance into and emergence from the organ of the blood-vessels, nerves, and hepatic ducts.

The liver is held in place by five ligaments, four of which are simple folds of peritoneum, while the fifth, or ligamentum teres, is a round cord formed by the obliteration of the umbilical vein and extending from the anterior edge of the liver at the notch between the left and right lobes to the umbilicus and along the under surface of the liver to its posterior border. The peritoneal folds which serve the purpose of ligaments are a longitudinal one extending on the upper surface of the organ from the notch in front to the posterior border, a coronary ligament which is found along the posterior border, and a right and a left lateral ligament. These peritoneal reflexions serve to hold the organ in place, keeping it more or less firmly in apposition with the diaphragm.

The blood-vessels entering the liver are the hepatic artery and the portal vein; the former being a branch of the celiac axis, the latter being the large venous trunk which is formed by the union of the superior mesenteric and splenic veins. Both the hepatic artery and portal vein divide in the transverse fissure into two parts, a right and a left, which enter the substance of the right and left lobes respectively.

The hepatic veins are the efferent veins of the liver conveying the blood from this organ into the inferior vena cava. In addition to these vessels, the liver, like other organs, is supplied with large and numerous lymphatics. The nervous supply of the organ is derived from the left pneumogastric, the hepatic plexus of the sympathetics, and from the right phrenic nerve. The bile ducts and hepatic ducts will be described below.

The gall-bladder is a small pear-shaped sac lying on the under surface of the liver. At its narrow end it opens into a small duct (cystic duct) which passes back and down to join the hepatic duct forming the common bile duct, which terminates in the duodenum. The gall-bladder is the reserve sac in which bile is stored and by the contracting of which a uniform flow of this liquid is maintained.

Structure of the Hepatic Substance.—The substance of the liver is made up of lobules of more or less equal size, separated by areolar connective tissue, which is a continuation of the fibrous covering of the organ or *capsule of Glisson*. In these fibrous septa between the lobules are found the larger blood-vessels, biliary ducts, lymphatics, and nerves. The lobule under a low power of the microscope is seen to be composed of radiating columns of liver cells converging to a central point in which is situated a large vein (intra-lobular vein) belonging to the system of the inferior vena cava. The columns of liver cells branch and anastomose with each other, and between them are spaces occupied by blood capillaries and the primary biliary passages. The liver cells themselves are polyhedral in shape, and are so arranged that a capillary space, known as the biliary capillary, is left between them. The capillary blood-vessels are similarly formed by the peculiar juxtaposition of the liver cells, leaving spaces in which the capillary blood-vessels extend from the terminal branches of the portal vein in the septa at the periphery of the lobules to the central vein already mentioned. The latter, collecting the blood from the capillary system, transports it to larger vessels known

as sublobular veins, which finally unite and form the hepatic veins and discharge the blood into the inferior vena cava. The hepatic arteries and their terminal branches occupy the septa and supply blood to the connective tissue constituting the septa, and to the walls of the portal veins and biliary ducts. The venous blood of this distribution is discharged into the terminals of the portal vein within the septa.

At the periphery of the hepatic lobules, the epithelial cells of the hepatic columns continue directly into the smaller bile ducts which are situated in the interlobular septa. These primary bile ducts unite to form larger ducts and finally a right and left hepatic duct emerging from the transverse fissure unite to form a common bile duct. This is further joined by the *cystic duct* or duct of the gall-bladder, and it terminates in the duodenum in a common orifice with the pancreatic duct.

The structure of the liver is such that the blood entering through the portal circulation comes in contact with the liver cells on one side while the capillary biliary passages are on the other side of the hepatic cell.

The lymphatic vessels accompany the portal vein and hepatic artery, and another system accompanies the branches of the hepatic vein. The capillaries penetrate into the lobules, passing between the hepatic cells.

Functions of the Liver.—The physiological functions of the liver are probably very numerous and are but imperfectly understood. The position of the organ indicates that one of its important functions is the elaboration of materials presented by the blood coming from the gastro-intestinal tract, and probably also the purification of this blood. As far as they are known, the functions of the organ may be divided into the *metabolic* and *biliary*.

Metabolic Functions.—It is known that the liver acts upon sugars and other carbohydrate materials to convert them into glycogen which is stored up by the hepatic cells. This accumulates during digestion and is utilized in the intervals, so that the percentage of sugar in the blood is kept at an approximately uniform standard. It is known that in certain diseases (for example, diabetes), this function is greatly disturbed with resulting consequences that affect the general health. The liver shares with the muscles of the body this glycogenic function.

Another important metabolic function is that of forming urea, the final stage in the metabolism of albuminous food. Uric acid also is to some extent formed in the liver but is more particularly the product of the lymphatic organs and tissues.

Biliary Function.—The formation of bile is one of the important attributes of the liver, though possibly this function is less predominating than has hitherto been believed. The bile is an albuminous liquid containing bile pigments (bilirubin, biliverdin), bile salts (glycocholate and taurocholate of soda), nucleo-albumin, cholesterol, fat, and other less important substances including various salts. The bile is secreted more or less intermittently, the amount being greatest about the middle part of the day and increasing after meals. The daily output is from one to two pints. Its functions are numerous. Among other properties it aids in the absorption of fatty foods, stimulates intestinal peristalsis, and prevents intestinal fermentation.

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and is the vehicle of excretion from the body of certain waste products, notably hemoglobin. It is known that bacteria and other minute foreign bodies are discharged from the system through this medium.

DISEASES OF THE LIVER.—The diseases of the liver may be classified under the following heads: Derangements of the Circulation; Nutritional and Inflammatory Disease of the Substance of the Liver; Tumors; Parasitic Diseases; Functional Disturbance.

Circulatory Disturbances.—*Congestion of the Liver* is an increase in the volume of blood in the organ. This may be transient or more or less permanent.

(a) Transient congestion follows the ingestion of food and drink, especially when these are of stimulating quality. It is also occasioned by circulatory activity, such as accompanies fevers and other conditions of systemic excitement. In these cases the increase of blood in the liver is the result of an excessive supply of blood to the organ.

(b) Passive congestion is the form in which the outflow of blood from the liver is interfered with. This form is likely to be more or less durable or permanent. Among the causes, the most important are diseases of the heart and the lungs, or any other cause of obstruction to the circulation in the thorax.

Pathological Anatomy.—In active or acute congestion no marked alteration is observed on examination of the organ. In passive congestion the liver becomes enlarged, and the central veins within the lobules are seen to be increased in size, while the peripheral parts of the lobule often become light-colored from degeneration of the liver cells. This gives the surface of section of the organ a peculiar appearance that has been well designated "nutmeg liver." When passive congestion is long continued, the hepatic cells, compressed by the dilated blood-vessels and otherwise disturbed in their nutrition, undergo atrophy, while at the same time some fibrous tissue growth replaces the degenerated hepatic cells, and the whole organ becomes darker in color from deposit of pigment from the stagnated blood. The result is that the organ decreases in size, becomes harder, and of a darker color than normal. The term *cyanotic or red atrophy* is given to this condition.

The symptoms of congestion of the liver vary with the kind, the degree, and stage of the disease. In acute congestion, such as follows over-indulgence in stimulating food and drink, a sense of heaviness in the region of the liver, and perhaps slight disturbances of digestion with general malaise constitute the symptomatology. In chronic or passive congestion, such as accompanies heart disease, the symptoms are quite distinctive. The organ increases in size so much that it is easily felt in the upper part of the abdominal cavity and it becomes tender or even acutely painful. Digestive disturbances are very common, partly as the result of the condition of the liver itself and partly as the result of the underlying condition which occasioned the congestion of the liver. Among these digestive symptoms, loss of appetite, difficult and painful digestion, nausea and vomiting are the most conspicuous. When the congestion of the liver is pronounced, more or less jaundice occurs.

This results from the thickening of the walls of the biliary ducts and the compression of the finer biliary channels by the swollen state of the organ. In marked cases, the jaundice may be intense; usually it is slight.

In the last stages of congestion of the liver when the organ has undergone cyanotic induration, the symptoms may be similar to those of cirrhosis (q.v.).

Treatment.—The treatment of congestion of the liver is directed primarily toward the relief of the condition which causes the congestion. In heart diseases, cardiac tonics are important. Sometimes a prompt relief is obtained by venesection. Depletion from the portal circulation by brisk purgation may also be efficacious, and regulation of diet is important as the congested organ is less able to withstand injurious effects of stimulating foods or drink than the healthy liver.

Diseases of the Substance of the Liver.—Among these may be considered: (1) Simple atrophy; (2) acute yellow atrophy; (3) fatty liver; (4) cirrhosis, and (5) abscess.

Simple Atrophy of the Liver occurs in cases of starvation or inanition from long continued disease. A frequent form is that called *pressure atrophy* which is found in cases of deformities of the chest, in which the ribs are pressed inward against the liver, and as a result of tight lacing. The substance of the organ does not change very greatly in atrophy, though the individual liver cells are smaller than normal and usually somewhat pigmented, giving the structure a darker color. The shape of the liver is often peculiar. In the case of deformities of the chest, the pressure exerted by the ribs may cause deep grooves in the surface of the liver, or there may be a single transverse furrow at the lower margin of the ribs where this is pressed against the organ. In the case of deformity from lacing, part of the right lobe is frequently elongated and extends directly downward from the body of the organ as a more or less attenuated process.

The function of the liver is probably not seriously impaired in any of these cases, though some disturbance undoubtedly occurs.

Acute Yellow Atrophy is a disease in which a marked fatty degeneration of the cells of the liver is the important change. It is a rather rare condition, occurring in youth and early adult life; and has frequently been found in persons of dissipated habits. Parturition is one of the determining causes, and probably in many cases the disease is due to the action of micro-organisms, or to some form of poisoning. Phosphorous poisoning may cause changes in the liver and general symptoms sometimes quite indistinguishable from those seen in acute yellow atrophy unassociated with such poisoning.

The liver is decreased in size, often to a remarkable degree. It is soft and on transverse section the substance is of a light yellow color with mottled areas of reddish or purplish hue, the latter being portions in which the substance is congested or in which hemorrhages have taken place.

Changes are found also in various other tissues of the body, showing that acute yellow atrophy is not wholly a disease of the liver but a general infection or intoxication, having its most marked manifestations in the liver.

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Symptoms.—After a period of indefinite digestive disturbances, acute jaundice, and marked nervous symptoms set in. The patient becomes deeply jaundiced, delirious, and sometimes comatose. In the course of ten days or two weeks the disease terminates fatally in a large percentage of cases. A small proportion of the cases recover. The treatment consists in stimulation or other measures called for by the general condition.

Fatty Liver.—There are two varieties of fatty disease of the liver, that known as *infiltration* and that termed *fatty degeneration*. In the former there is a deposition of fat in the liver cells, similar to that which is found in the subcutaneous tissues in ordinary obesity. In the latter the liver cells undergo destruction with formation of fat. Fatty infiltration may be the result of excessive supply of nutriment as in ordinary obesity, and is also found in certain states of general weakness and wasting, particularly in association with diseases of the lungs. In the latter cases, the cause is to be found in the deficient consumption of fat, owing to diminished oxygenation. Fatty degeneration may be caused by various infectious diseases, but is more particularly the result of poisoning with phosphorus, arsenic, mercury, and other poisons.

In fatty infiltration, the liver is enlarged, lighter than the normal organ in specific gravity and in color, and on section with a knife the increased fat is indicated by an oily character of the cut surface. In fatty degeneration the liver is usually diminished in size and the substance is of a friable softened character.

There are no characteristic symptoms of fatty infiltration, but the increased size of the organ may cause a local feeling of fulness and pressure, and vague disturbances of the general health may also be attributable to the condition. In fatty degeneration, the symptoms are equally obscure. That due to phosphorous poisoning may present itself with the symptoms of acute yellow atrophy (*vide supra*).

Cirrhosis of the Liver is the most frequent and important of the diseases of this organ. It is essentially a replacement of normal liver tissue by connective tissue, causing more or less hardening.

The causes of cirrhosis of the liver are numerous, though one in particular occupies a very prominent position on account of its frequency. The cause referred to is over-indulgence in alcohol, especially raw spirits, whence the terms alcoholic liver, gin drinker's liver, etc. It must not be supposed, however, that alcohol is the invariable cause. Over-eating, gouty conditions, syphilis, and various other infectious diseases may be followed by cirrhosis entirely like that caused by alcohol. It has been noted in the description of congestion of the liver that a form of cirrhosis (cyanotic induration) results from long standing congestion. Sometimes cirrhosis of a peculiar type is caused by obstruction of the biliary ducts. This produces a stagnation of the bile and an irritation of the substance of the liver that terminates in the formation of connective tissue.

Pathological Anatomy.—Two forms of cirrhosis of the liver are recognized. One, known as the *atrophic*, in which the liver is decreased in size; the other, *hypertrophic*, in which the organ is increased in size. In atrophic cirrhosis (hob-

nail liver, granular liver), the organ has an irregular nodulated or granulated surface, the irregularities being caused by the contractions of the connective tissue which forms the basis of this pathological state of the organ. The liver is decreased in size, though not always very notably. It is very firm, and on section the increased connective tissue can be recognized in the form of more or less distinct septa interlacing the lobules or groups of lobules of the liver substance. The lobules and groups of lobules are compressed by the contracting connective tissue, and as a result undergo atrophy and degenerative change. The connective tissue formation which is characteristic of this form of cirrhosis is found in the interlobular tissues surrounding the terminal branches of the portal vein. Consequently the portal circulation is obstructed, and congestion of the various abdominal organs whose blood is discharged through this circulation results. When cirrhosis has proceeded for some time, new channels of circulation may be established, by which the congestion of the abdominal organs is relieved. There results from this visible enlargement of the veins of the abdominal walls and increased size of the veins in the lower end of the oesophagus and in the rectum.

Hypertrophic cirrhosis of the liver is a form in which the liver is increased in size. The surface is usually smooth and the substance of a uniform character. This is due to the fact that the new connective tissue is uniformly distributed within as well as between the liver lobules. This form of disease may be the result of the same causes as the atrophic variety, but is more commonly due to obstructions of the flow of bile. Very commonly interference with the discharge of bile is found in this form, as interference with the circulation of blood is characteristic of the other variety.

Symptoms.—The symptoms of cirrhosis of the liver in earlier stages are very obscure and uncertain. Later interference with the portal circulation causes congestion of the mucous membrane of the stomach and intestines, with resulting disturbances of digestion, such as dyspepsia, vomiting, constipation, and even hemorrhages from the stomach or bowel. The spleen is enlarged from congestion of its substance and the last phase of the disease is marked by dropical effusion in the abdominal cavity (ascites). Cirrhosis of the liver is a chronic disorder which may extend over a period of many years and which may be arrested even after it has reached an advanced stage. Among the symptoms of hypertrophic cirrhosis are tenderness and increase in the size of the liver, the development of jaundice, and sometimes the occurrence of fever. The disease is more rapid in its course than the atrophic variety.

Treatment.—The treatment of this condition is preventative rather than curative. When due to alcohol it may be arrested if not too well advanced, by a control of the habit of drinking; and a restitution of normal conditions may be favored by careful diet, including mainly the avoidance of stimulating or irritating food, and of general excesses of diet. The use of saline waters may be beneficial. When advanced to the stage of dropsy of the abdominal cavity, depletive measures, such as are used for the relief of dropsies in general, may be useful; or it may be necessary to remove the liquid by tapping.

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Abscess of the Liver may result from dysentery and other ulcerative conditions of the intestines, in which cases the abscess is likely to be solitary; or it may accompany a septicæmia originating in the abdominal cavity from some local disease like appendicitis or puerperal infection, in which case multiple small abscesses are found throughout the substance of the liver. Another variety of multiple abscess is that in which obstructions of the biliary ducts by gallstones occasions retentions of bile and the formation of local foci of suppuration.

Abscess is more common in tropical countries, probably on account of the greater frequency of dysentery in such localities. The direct cause of this form of abscess is probably the *Amœba coli* which bears a causative relation to certain forms of tropical dysentery.

Pathological Anatomy and Symptoms.—The liver is enlarged, and sometimes a projecting mass can be seen in the upper right portion of the abdomen. The abscess may be of small size, but frequently reaches very considerable proportions, containing perhaps a pint or more of thick pus. It may discharge externally through the skin, into the abdominal cavity or some of the abdominal organs, and even through the diaphragm, into the lung and bronchi. Occasionally a spontaneous cure results in this way. More commonly the patient perishes before the abscess ruptures, from general infection or from prostration. The disease is frequently attended with great pain, with jaundice and with irregular fever.

Treatment.—The only effective treatment of abscess is surgical operation.

Tumors.—Among the tumors of the liver, the most important is cancer. This is usually secondary to cancer of the stomach or intestines. It may, however, be primary in the liver. The liver is found enlarged and its surface irregularly studded with nodules varying in size from that of a pea to that of an apple, or even larger masses. The cancerous nodules are of white or pinkish color and the liver substance between them is usually more or less compressed and pigmented.

Symptoms.—The important symptoms are profound disturbance of general health with emaciation, such as characterize cancer in any part of the body; pain in the region of the liver, and increase in the size of the organ; jaundice of intense and lasting character; and occasionally dropsy of the abdominal cavity.

Parasitic Diseases.—The most important of these is the *hydatid cyst*, which results from the lodgment of the embryo of the *Tenia echinococcus*, a tapeworm occurring in the adult state in the intestines of dogs and some other animals. In man the larval condition alone is met with. The embryo in the liver becomes surrounded by a capsule in which a light liquid collects and thus a cyst is formed. Secondary cysts (daughter-cysts) may develop within the original one and thus a large cavity filled with smaller spherical cysts may result. The liver increases in size and the cyst may be visible, or it may be felt through the abdominal walls as a resilient projecting mass. The hydatid cyst may subsequently contract by absorption of its liquid contents or it may rupture in the same manner as an abscess. The symptoms of this disease are frequently obscure, but jaundice (from pressure

on the bile ducts), dropsy of the abdominal cavity from pressure on the portal vein, and other "mechanical" symptoms may occur.

Jaundice.—The important functional disturbance of the liver is jaundice. This condition is one in which the biliary coloring matter is absorbed by the blood and deposited in the tissues of the body. The causes of jaundice are very numerous. The condition may result from any cause of obstruction of the outflow of the bile through the biliary ducts or from any serious disease of the liver substance, such as abscess, cancer, acute yellow atrophy, etc. Various poisons and infectious diseases cause jaundice by their destructive action on the liver.

The most frequent form of jaundice is that known as *simple catarrhal jaundice*, which results from digestive disturbances, especially such as follow great excess in eating or drinking and exposure to cold. In this variety, the outflow of the bile is impeded by swelling of the mucous membrane of the duodenum where the common bile duct discharges, and also by swelling of the lining membrane of the larger bile ducts themselves. When the bile formed within the liver cannot find normal discharge, it is absorbed into the blood, and finding its way to various parts of the body, discolors these, causing the yellow appearance of the skin and mucous membranes which characterizes the disease. The bile may be in part discharged from the body through the urine, and even in the sweat, tears, and other liquid discharges.

Symptoms.—The symptoms of catarrhal jaundice are, in the first place, those of intense disturbances of digestion, such as great pain in the region of the stomach, nausea, and vomiting; later, the appearance of a yellowish discoloration of the skin and mucous membranes. The faeces become light-colored from the absence of biliary coloring matter, and in advanced cases they are actually a light clay color or even white. The urine becomes dark brown or greenish in color. The patient is depressed, often even melancholy. The pulse is slow; the temperature as a rule is depressed, though there may be a moderate degree of fever.

Treatment.—Careful dieting is an essential in the treatment. The patient must abstain from food entirely at first, and later take the less irritating of foods, such as milk, broths, and the like. Remedies, like bismuth, pepsin, small doses of calomel, and salines are administered to improve the state of digestion and lessen the congested condition of the stomach and duodenum. Drastic purgatives are harmful. Warm applications over the region of the liver are efficacious. The disease usually subsides in a few days or in a week or two.

Gall-stones.—Gall-stones are usually formed within the gall-bladder. Very rarely they may originate in the biliary ducts within the liver. They result from inspissation of the bile and inflammatory conditions in which exfoliated epithelial cells or mucus in the gall-bladder or biliary ducts accumulate and form a basis for concretion of thickened bile. The gall-stone consists of biliary pigment matters, but in some cases almost wholly of one of the constituents of bile, cholesterol. On section through a gall-stone, a central nucleus may be seen which is composed of epithelial detritus and inspissated mucus, together with bacteria in many cases.

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Around this is deposited cholesterol or biliary pigment. The gall-bladder may contain a single stone or, more commonly, a number, and sometimes even hundreds are found.

Gall-stones are more common in women past middle life than in younger persons or in the male sex.

Symptoms may be wanting until a stone enters the cystic duct and becomes lodged in the latter, or passing through this, becomes obstructed in the common bile duct. The symptoms of such a passage of gall-stone are known as biliary colic. The patient is seized with intense pain, radiating to the right and to the back, sometimes as high as the right shoulder. Vomiting and other reflex disturbances and even collapse may occur. When the stone lodges, jaundice is the most pronounced symptom. Frequently the gall-stone passes with some effort and the paroxysm is relieved. Sometimes this relief is brought about by a recession of the stone into the gall-bladder.

Treatment.—The treatment of gall-stone consists of careful diet and the use of saline waters to improve the digestive conditions and render the bile as liquid as possible. Gall-stones may thus be diminished in size and enabled to pass through the ducts. During the paroxysm of biliary colic, remedies to relieve pain are imperatively necessary. Hypodermic injections of morphine and even narcosis with ether or chloroform may be required. Surgical operation for removal of the stone is often desirable.

Liver-fluke. See DISTOMA; TREMATODA.

Liver-leaf, or Noble Liverwort. See HEPATICA.

Liv'ermore, Mary Ashton Rice, American reformer and lecturer: b. Boston, Mass., 19 Dec. 1821. She was married in 1845 to Rev. D. P. Livermore, a Universalist minister (d. 1899), and was early in life active in the anti-slavery and temperance movements. In 1862 she was appointed agent of the Northwestern branch of the United States Sanitary Commission at Chicago and since the Civil War period has been conspicuous in her efforts to promote the woman suffrage and temperance movements. She is the president of the Massachusetts Woman's Suffrage Association and was for 10 years president of the Massachusetts Woman's Christian Temperance Union. Among her popular lectures are: 'What Shall We Do with Our Daughters?'; 'Women of the War'; 'The Moral Heroism of the Temperance Reform.' She is the author of 'Pen Pictures' (1865); 'Thirty Years Too Late' (1878); 'My Story of the War' (1888); 'The Story of My Life' (1897); etc.

Liv'erpooL, England, a seaport city and civic county, in Lancashire, on the Mersey estuary, about four miles from its mouth on the Irish Sea, and 185 miles northwest of London. After London it is the largest city and most important commercial port of the British empire, and in the number of its shipping and its aggregate tonnage is the first in the world. The city, irregularly built, extends for six miles along the level ground of the dock and wharf-lined east bank of the river, and in a semicircle climbs the undulating slopes in the vicinity, the highest point of which rises 230 feet above the river. During the latter quarter of the 19th century, the demolition of old houses, the erection

of vast warehouses and office buildings, the formation of new streets and the widening of old ones, have completely modernized the city. The modern public buildings are magnificent, while the new commercial buildings generally are of ornate classic design. Among the principal buildings are the town hall; the quadrangular building of the municipal offices 226 feet by 195 feet, centrally situated, with a conspicuous feature in its clock-tower and spire 200 feet high; St. George's Hall, a sumptuous building in the Corinthian style externally and internally, 420 feet long, with a colonnade of 16 columns, 200 feet long; the revenue buildings covering an area of 6,700 square yards, with a length of 467 feet, 67 feet high, and accommodating the inland revenue offices, posts and telegraphs, and the Mersey Dock and Harbor Board; the new Exchange in Italo-French Renaissance, with a frontage of 1,500 feet, lavishly decorated; and the free public library and museum, the gift of Sir William Brown, a local merchant, a handsome building of Corinthian order. One portion of the building is a reference library, with 120,000 volumes; the other section is the museum, containing departments of natural history and of antiquities. To the east of the library and museum another citizen, Sir Andrew Barclay Walker, has erected a public gallery of art, a splendid structure richly furnished with paintings and sculpture presented by other wealthy patrons of the arts, or purchased by the corporation. Between the museum and the art gallery the town council has erected as an addition to the library a public reading room, called the Picton reading room. In connection with the reference library there are six lending libraries in various parts of the city.

Other structures include many splendid piles of commercial buildings, banks, and charitable institutions. Those associated with maritime vocations are especially conspicuous and useful. Several new hotels have been built of great size and architectural splendor. The provision markets are spacious, airy, covered buildings, and are five in number. The Haymarket is an area of about 15,000 superficial yards, nearly half of which is roofed. Among the places of worship are St. Catherine's, St. Michael's, St. Nicholas', St. Luke's, the Church for the Blind, Great George Street Chapel, Hope Street Unitarian Chapel, St. Francis Xavier's, and St. Mary's Roman Catholic chapels, St. Andrew's Scotch Church, and Sefton Park Presbyterian Church. When Liverpool was constituted a bishop's see in 1880, the parish church of St. Peter was made the cathedral, but a new cathedral is building, many liberal contributions having been made for the purpose.

Among the charitable and benevolent institutions are the royal infirmary, children's infirmary, Northern and Southern hospitals, lying-in institutions, dispensaries, etc., public disinfecting establishments, and public baths. There are also various orphanages, refuges for the destitute, and institutions for the relief of every form of human suffering. The educational institutions include the University College, Royal Institution, the Liverpool Institute, Liverpool College, school of art and gallery of art. The University College (for which a fine building has been erected) is one of those belonging to the Victoria University; it has a department of

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language, science, etc., and a medical department. Besides the great educational machinery erected by the school board, private schools are numerous.

Liverpool is deficient in squares and open spaces within the city boundary, there being only three of any pretensions, but it is provided with an unusual number of public parks on the margin of the populous districts. These have been mostly provided by the corporation out of the rates, and they form a cordon around the town, available to the inhabitants of each quarter. Stanley Park (100 acres) in the north of the town is well-laid out and picturesquely planted. Sefton Park, of 375 acres, is at the extreme south of the town. The ground is naturally broken into hill and hollow, the heights affording beautiful views; about 269 acres are reserved for the park, the remainder being appropriated to villa sites. The adjuncts of the park embrace a "Rotten Row" and carriage drives, botanical gardens, lakes, cascades with rock work, pavilions, and other ornamental buildings, a conservatory, fountains, etc. The total area of public parks and pleasure grounds under the control of the corporation is 772½ acres, costing in land and works about \$4,000,000. Of the public cemeteries the most considerable are those of the parish of Liverpool at Anfield, the Toxteth cemetery, Kirkdale, Fazakerley, and West Derby cemeteries. Liverpool is well supplied with water. Local wells furnish part, and part comes from the reservoirs in the hilly district between Bolton and Blackburn, distant from Liverpool 25 to 35 miles. From the collecting reservoirs at Rivington the water, after being filtered, is conveyed to the distributing reservoirs in town, the average quantity distributed daily being about 20,000,000 gallons, and the population supplied, about 850,000. An additional supply of water from the Vyrnwy in North Wales, the works for which were completed in 1892, yield a daily supply of about 50,000,000 gallons. This enterprise included the formation of Lake Vyrnwy, an artificial sheet of water five miles long, contained within a great dam or embankment 60 feet high across the Vyrnwy.

Liverpool is the chief outlet for the manufactures of Lancashire, West Yorkshire, and Staffordshire, and carries on an immense export and import trade, especially with the United States. It possesses a magnificent series of docks and basins, and other requisites of a great seaport. The Mersey Dock Estate, on the right or Liverpool bank of the Mersey, extending in an unbroken line for about 7 miles, since 1893 is traversed throughout by an overhead electric trolley line. The river wall from the northern boundary of the Dock Estate to Herculaneum graving docks is over 6 miles in length. There are 53 wet docks and half-tide docks, among the largest of which are the Alexandria, Brunswick, Canada, Hornby, Huskisson, Langton, Prince's, Queen's, and Toxteth. There are numerous graving docks for the repair of iron and wooden vessels, and gridirons for their casual overhaul. The most modern of the graving docks, that at Canada Dock, is among the largest in the world, its length being 925½ feet, and width of entrance 94 feet. The total water area and quay space of the Liverpool and Birkenhead

docks and basins is 550 acres, of which 385 are on the Liverpool side.

On the margins of the docks are gigantic warehouses. The quays are abundantly furnished with railway lines and every other mechanical appliance for expediting the transport of goods and economizing labor.

One of the principal river features is the floating landing-stage moored off the Prince's and George's docks, in the heart of the town. This magnificent structure, supported on iron pontoons, rising and falling with the tide, and connected with the river wall by bridges of easy gradient, is an effective engineering device to meet the tidal conditions obtaining on the Mersey, where spring tides present a difference in level between high and low water of over 30 feet, and even neap tides have a range of 13 feet. The first small stage was built in 1847, a much larger was destroyed by fire in 1874; the present stage, as enlarged in 1896, has a length of 2,463 feet, and a width of about 80 feet. The great Atlantic liners come alongside the stage, and lie there for such time as may be necessary to receive and discharge passengers and mails, for all which traffic the Riverside station, specially constructed alongside the stage, offers a most convenient railway terminus. A great coasting passenger traffic is also centred at the landing-stage, and in the summer especially the traffic to the Isle of Man and ports on the coast of North Wales reaches immense proportions. The southern end of the stage is appropriated to passenger and freight ferry traffic between Liverpool and Birkenhead, Seacombe, New Brighton, and other suburban centres of population and recreation on the opposite bank of the Mersey. At the northern end of the stage a fixed jetty supplements its accommodation, and is more particularly used for the landing of cattle, chiefly from Ireland. In 1900 the number of vessels entered at the port of Liverpool was 20,300 of 9,315,674 tons (4,107 of 621,493 tons sailing vessels, and 16,193 of 8,694,181 tons steamers), the number cleared 19,670 of 9,158,332 tons. The total tonnage entered from foreign and colonial ports was 6,001,563; cleared for these ports 5,666,145. The shipping registered as belonging to the port on 31 Dec. 1900 was 1,018 sailing vessels, with an aggregate burden of 614,968 tons, and 1,073 steamers of 1,713,506 tons; total, 2,091 vessels of 2,328,474 tons.

Among the imports into Liverpool, cotton holds the chief place, the quantity imported in 1900 being valued at \$155,908,000, the total quantity imported into the kingdom being valued at \$204,912,970. Immense quantities of wheat, flour, maize, etc., are also imported mainly from North America. Live cattle and fresh meat also form leading imports. To prevent the spread of disease, the former are dealt with at the Foreign Animals' Wharf at Birkenhead, where over 20 acres of ground are devoted to this purpose, and quarters capable of accommodating 7,600 head of cattle and 16,000 sheep at one time are provided, together with slaughter houses, chill-rooms for cooling the meat to allow of its transfer to the country, and other conveniences in suitable proportion. The average number of cattle dealt with in one year is about 250,000, and of sheep 350,000.

Other extensive imports are provisions, sugar, fruits, hides, palm and olive oil, wine and spir-

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its, timber, tobacco, and wool. Cotton manufactures are the chief export, others are metals and articles in metal, machinery, woolens, etc. The value of the foreign and colonial merchandise imported in 1900 was \$623,567,000, of the home and foreign produce exported, \$512,864,000; amount of customs revenue, \$20,873,900. The manufactures and other industries of Liverpool are varied, among them being hemp and wire rope making, sail making, iron forging, anchor and chain cable making, iron and brass founding, the making of steam-engines and other machinery, sugar refining, soap making, alkali making, etc. The manufacture of watches and chronometers is extensive. There are many large steam mills for grinding corn, rice, colors, dyewoods, etc. Ship-building is carried on to a small extent.

Four lines of railroad enter the city, namely the London & Northwestern railway; the Lancashire & Yorkshire; the Midland, Great Northern & Great Central, and the Great Western, to Birkenhead, and thence to Liverpool by ferry boats or by the Mersey Tunnel railway, a great work opened for traffic in 1886, 4½ miles in length, including the approaches.

The town is divided into 29 wards, which elect each three councillors. There are 29 aldermen and a lord mayor. The borough sends nine members to Parliament.

Liverpool is comparatively of recent growth. A castle was built here by Roger de Poictiers, to whom William the Conqueror gave the extensive tract of land between the Mersey and the Ribble. It was a small fishing town surrounded by a high mud wall when it was besieged and taken by Prince Rupert in 1644. In 1645 the Parliament settled the mill and ferry boats on the corporation as a satisfaction for their losses. In 1709 a wet dock was constructed, the first in the kingdom. From this event dated the rapid extension of its commerce and population. In 1880 Liverpool was made the see of a bishop, and in that year a charter was granted constituting it a city. The population, which in 1801 was only 77,653, in 1891 was 517,980; and in 1901, 686,332.

Liverpool, Nova Scotia, Canada, the capital of Queen's County, a town and port of entry on the south bank of the Mersey estuary at its entrance into Liverpool Harbor, 108 miles southwest of Halifax. It has large fisheries, and some manufactures of lumber, machinery, and shoes. Pop. (1901) 1,937.

Liv'erworts, or Hepaticæ, a group of cryptogamous plants, forming one of the two divisions of the class *Bryophyta* or *Muscineæ* (moss-worts), and closely related to the true mosses (*Musci*), with which some of the species are apt to be confounded. They are either spread out in the form of a simple lobed thallus, showing differentiation into a dorsal (upper) and a ventral (lower) surface, or they are composed of a small ramified stem bearing sessile leaves in two or three ranks. Root-like bodies (rhizoids) attach the plant to its substratum. Many liverworts reproduce themselves by means of brood-cells (thallidia or gemmæ), formed asexually in cups on the surface, in leaf-margins, etc. They are also reproduced sexually by means of club-shaped antheridia, containing the male elements (antherozoids), and flask-shaped archegonia, containing each an egg-cell or

oosphere. These sexual organs occur in groups either in small depressions or special outgrowths of the thallus, or as so-called flowers at the tips of the leafy shoots, or in the axils of their leaves. The spore-capsule is formed after fertilization within the archegonium, and the spores are often provided with hygroscopic elaters which assist in their dispersal. On germination a spore produces, not the common liverwort plant, but a very small filamentous protonema. There are four families of liverworts, namely, *Ricciaceæ*, *Marchantiaceæ*, *Anthocerotaceæ*, and *Jungermanniaceæ*. The first includes the duckweed-like crystalwort (*Riccia natans*); the second the exceedingly common *Marchantia polymorpha*, formerly used as a basis for medicine for ailments of the liver (whence the name "liverwort"); and the last, which is much the largest family, comprises all the leafy, as well as some thalloid forms. The Hepaticæ are generally distributed over the world, and prefer situations similar to those occupied by the mosses. There are about 4,000 species, of which about 3,500 belong to the *Jungermanniacæ*. See authorities on cryptogamic botany, especially Cooke's 'British Hepaticæ' (1893); and Strasburger, 'Text-book of Botany' (1903).

Liv'ia, Livilla, Roman woman; d. 35 A.D. She was a granddaughter of Livia Drusilla (q.v.) by Drusilla's other son, Drusus Germanicus. She married her cousin, Drusus, a son of Tiberius, and having poisoned her husband in concert with Sejanus, died in a dungeon.

Livia Drusilla, Roman empress: b. about 56 B.C.; d. 29 A.D. She was a daughter of Livius Drusus Claudianus, and was first married to Tiberius Claudius Nero, who was the father of her sons, Tiberius and Drusus. Tiberius Nero was obliged to divorce her in order to gratify Augustus, who divorced his own wife Scribonia in order to marry her. Having no children by her, the emperor adopted her sons by her first husband, one of whom, Tiberius, became his successor.

Liv'ingston, Edward, American statesman: b. Clermont, N. Y., 26 May 1764; d. Rhinebeck, N. Y., 23 May 1836. He was graduated from the College of New Jersey in 1781, was admitted to the bar in 1785, was a New York representative in the 4th, 5th, and 6th Congresses (1795–1801), and was a leader of the opposition. In 1801 he was appointed by President Jefferson United States attorney for the New York district, and in that year became also mayor of New York. During the yellow fever epidemic in 1803 he was stricken with the disease, and during his illness \$43,666.21, for which he was responsible to the United States government, were misappropriated by his fiscal agent. He confessed judgment in favor of the United States for \$100,000, and resigned both his offices. In 1804 he began the practice of law and land speculation at New Orleans. At the time of the preparation for the battle of New Orleans, he was president of the committee of public defense, and Jackson's chief assistant. During the battle he served on Jackson's staff. In 1820 he was elected a representative to the State legislature of Louisiana, in 1823–9 represented the New Orleans district in Congress, and from 7 Dec. 1829 to 3 March 1831 was United States senator from Louisiana. In 1831 he became secretary

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of state in Jackson's cabinet. This post he resigned to become minister to France in 1833; and in 1835 he returned to the United States. He was a distinguished lawyer; and as secretary of state exercised strong influence on the administration of Jackson, whose state papers, including the Nullification proclamation of 10 Dec. 1832, are generally believed to have been written by him. Among his writings are: 'System of Penal Law for the State of Louisiana' (1826); 'System of Penal Law for the United States' (1828). His 'Complete Works on Criminal Jurisprudence' appeared in 1873. Consult the biography by Hunt (1864).

Livingston, Henry Brockholst, American jurist: b. New York 26 Nov. 1757; d. Washington, D. C., 19 March 1823. He was a son of William Livingston (q.v.), and graduated from the College of New Jersey in 1774, was commissioned a captain in the Continental army, and later became aide to Gen. Philip Schuyler in the northern department with rank of major. He was also aide to Gen. Arthur St. Clair, took part in the siege of Ticonderoga, and was present at Saratoga. Subsequently he was again with Schuyler and was promoted lieutenant-colonel. In 1779 he went to Spain as private secretary to John Jay, in 1782 on the return voyage was captured by the British, and was for a time imprisoned at New York. In 1783 he was admitted to the bar and entered practice in New York. He was judge of the New York supreme court in 1802-7, and in 1807 became associate justice of the United States Supreme Court. On the organization of the New York Historical Society in 1805 he became its 2d vice-president.

Livingston, Peter van Brugh, American merchant: b. Albany, N. Y., October 1710; d. Elizabethtown, N. J., 28 Dec. 1792. He was graduated from Yale in 1731, at New York was active in the shipping business with William Alexander, Lord Stirling, and in 1755 provided the supplies for Governor Shirley's expedition to Acadia. He was long a member of the provincial council, and in 1755-6 was a delegate to the 1st and 2d provincial congresses of New York, of the former of which he was president. In 1776-8 he was treasurer of the congress. He was prominent in most of the measures that led up to the Revolutionary War, and was referred to by John Adams as "stanch in the cause."

Livingston, Philip, American patriot: b. Albany, N. Y., 15 Jan. 1716; d. York, Pa., 12 June 1778. He was graduated from Yale in 1737, became a prosperous merchant in New York, in 1758-69 was a member of the Colonial assembly, of which he was speaker in 1768, but was unseated by the Tory majority because of his strong Whig views. In 1774-8 he represented New York in the Continental Congress, and in 1776 signed the Declaration of Independence. Subsequently he sat in the New York provincial congress, in the State assembly, and in the senate. His legislative services were many.

Livingston, Robert, English proprietor in America: b. An crum, Scotland, 13 Dec. 1654; d. Albany, N. Y., 20 April 1725. He emigrated to America in 1673, spent a part of a year at Charlestown, Massachusetts Bay, removed to Albany, N. Y., and was there in 1675-86 secretary of the commissioners who directed the affairs of Albany, Schenectady, and the region adjacent.

In 1686-1721 he held the corresponding office of town-clerk. In 1686 he received from Gov. Thomas Dongan the grant of a large tract, which comprised extensive portions of the present counties of Dutchess and Columbia, and which was confirmed by royal charter of George I. in 1715. This tract was erected into the lordship and manor of Livingston, and as Livingston Manor has since been known. Livingston was the first to obtain the means for the equipment of the expedition of Capt. William Kidd (q.v.) against the pirates. He was elected member of the assembly for Albany in 1711, and sat for his manor in 1716-25. From 1718 he was speaker.

Livingston, Robert R. (the initial R. having been assumed for purposes of distinction), American statesman, commonly known as "Chancellor Livingston": b. New York 27 Nov. 1746; d. Clermont, N. Y., 26 Feb. 1813. He was graduated from Columbia (then King's College) in 1765, was admitted to the bar in 1773, was for a brief period partner in legal practice with John Jay, in 1773-5 was recorder of New York city, lost this post through his revolutionary spirit, and in April 1775 was elected from Dutchess County to the New York State assembly. In 1776 he was sent by the assembly to the Continental Congress, where he was one of the committee of five appointed to draft the Declaration of Independence, which, however, he did not sign owing to his return to enter the provincial convention. He took his seat on 8 July 1776, and was of the committee to draw up a State constitution. Under this instrument he became the first chancellor of New York (1777-1801). He resigned from the Continental Congress in 1777, but was again one of its members in 1779-81. He was secretary for foreign affairs of the United States Confederation in 1781-3, in which post he conducted with much success the business previously entrusted to the committee of secret correspondence. As chancellor he administered the oath of office to George Washington on the latter's inauguration as first President of the United States (30 April 1789). In 1801-5 he was minister to France, in which capacity he, with James Monroe as additional plenipotentiary, concluded the treaty by which Louisiana was ceded to the United States for the sum of \$15,000,000. He became the partner of Robert Fulton (q.v.) in experiments toward the employment of steam-power in navigation; launched a boat on the Seine, but was not fully successful; and later continued the work with Fulton in the United States, where in September 1807 the Clermont made the trial trip from New York to Albany in 22 hours, the average rate of speed thus being 5 miles per hour. Livingston also introduced merino sheep into New York, made general the use of gypsum for fertilizing purposes, was the principal founder (1801) of the New York Academy of Fine Arts and its first president, and was also for a time president of the New York Society for the Promotion of Useful Arts. He was styled by Franklin the "Cicero of America." By act of Congress his statue was placed in the Capitol at Washington, as one of the two representative citizens of New York State, George Clinton being the other. He published 'Essays on Agriculture,' an 'Essay on Sheep' (1809), and some addresses. Consult the biographical sketch by De Peyster (1876).

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Livingston, William, American statesman: b. Albany, N. Y., 30 Nov. 1723; d. Elizabethtown, N. J., 25 July 1790. He was graduated from Yale in 1741, was admitted to the bar in 1748, attained distinction in practice, was elected to the provincial legislature from Livingston manor, and in 1760 established himself at the well known country-seat of "Liberty Hall" at Elizabethtown, N. J. In 1774 he became a delegate for New Jersey province to the 1st Continental Congress, and later served in the 2d and 3d Congresses. He was a member of the committee of the 1st Congress that prepared the address to the people of Great Britain. In June 1776 he took command of the militia of New Jersey, with rank of brigadier-general, and was thereby prevented from signing the Declaration of Independence. On 28 Aug. 1776 he was elected first governor of New Jersey, and this post, having resigned his military command, he held until his death. During the first two years of his administration the State of New Jersey was perhaps more than any other exposed to the operations of the British forces, and this was the cause of many difficulties and dangers. The legislature was compelled to meet at various different places, and Tory hostility was strong against the governor, whose capture was several times attempted. In his message of 1777 to the assembly, Livingston recommended the abolition of slavery, and in 1786 caused the passage of an act forbidding the importation of slaves into New Jersey and himself liberated his two slaves. In 1787 he was appointed a delegate to the convention that framed the Constitution of the United States. He was at one time president of the "Moot," the well known lawyers' club founded at New York in 1770. He published in 1752-52 numbers of "The Independent Reflector," a weekly periodical, in which he opposed the Episcopal Church. His writings include: "Philosophic Solitude" (1747); "A Funeral Eulogium on the Rev. Aaron Burr" (1757); and "A Digest of the Laws of New York, 1691-1762" (with W. Smith, Jr., 1752-62). Consult Sedgwick, "Life and Letters of William Livingston" (1833).

Livingston, Mont., city, county-seat of Park County; on the Yellowstone River, and on the Northern Pacific railroad; about 45 miles north of the Yellowstone National Park, and 100 miles southeast of Butte. It is situated in a mining and lumbering section of the State. A branch of the Northern Pacific railroad extends from Livingston to the Yellowstone Park. It is the division headquarters for the Northern Pacific. The railroad depot cost \$75,000. Its chief manufacturing establishments are machine-shops, lime-works, railroad shops, and lumber-mills. Its trade is mainly in mining tools, wool, coke, coal, and gold, and it is a distributing centre for groceries, dry goods, and clothing for an extensive region. Livingston is a favorite resort for sportsmen, as game and fish abound. Pop. (1900) 2,778.

Livingston College, a coeducational institution founded in 1882, in Salisbury, N. C., under the auspices of the African Methodist Church. In 1903 there were connected with the school 24 instructors and 360 students. The library contains about 5,000 volumes; the buildings and grounds are valued at \$130,000; and

the productive funds \$110,000. The college course leads to the A.B. degree.

Livingston Manor, at one time a large tract of land in New York State, on the east side of the Hudson River, and the northern part of what is now Dutchess County. This land was obtained by Robert Livingston, in 1674, and comprised about 160,240 acres. The title was confirmed in 1715, and the patent obtained gave the land to the heirs forever. In 1752-4 Gov. Clinton of New York had to settle a dispute as to the eastern boundary; Massachusetts and the Livingstons both claiming the same land. The manor was divided and subdivided into holdings which are let to tenants. In 1795 the tenants made an effort to have the title pronounced invalid, but it was decreed that the land was Livingston property. In 1844 the tenants again sought to get possession, and they petitioned the Legislature to set aside the grant; but the petition was not granted. Since that time the owners have sold to individuals the larger part of the old Livingston Manor.

Livingstone, living-stōn, David, Scottish missionary and African traveler: b. Blantyre, Lanarkshire, 19 March 1813; d. near Lake Bangweolo, Africa, 1 May 1873. His parents had settled in the neighborhood of the cotton mills near Blantyre, where David became a "piecer" at the age of 10. While at work in the mill he learned Latin and read extensively, and having attended the medical and Greek classes at Glasgow University during the winter months, finally became a licentiate of the Faculty of Physicians and Surgeons of Glasgow. Under the direction of the London Missionary Society he proceeded in 1840 to South Africa, where he joined Robert Moffat in the missionary field. His first station was in the Bechuanaland territory, and here his labors for nine years were associated with Mr. Moffat, whose daughter he married. Hearing from the natives that there was a large lake north of the Kalahari desert, he proceeded to explore that region, and discovered the valley of the Zouga and Lake Ngami. Subsequently he penetrated farther northwest until he reached Linyanti, the capital of the Makololo territory, situated on the Chobe, a tributary of the Zambezi, which river he also visited. In 1853-6 he made a great exploratory journey, or series of journeys. Starting from Linyanti he ascended the Leeambye (Upper Zambezi), journeyed overland to Lake Dilolo, and thence to St. Paul de Loanda on the west coast. Returning to Linyanti, he went eastward from there in 1855, tracing the Zambezi to the Indian Ocean, and reaching Quilimane on the east coast in 1856, having thus crossed the entire continent. The record of this journey is found in his "Missionary Travels and Researches in South Africa" (1857). After making various journeys and exploring the Lake Nyassa and Zambezi region, Livingstone set forth in 1865 to set at rest the question of the sources of the Nile. From this time till his death he was engaged in laborious explorations in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered Lakes Bangweolo and Moero, the Upper Kongo, etc. For about three years no communication had come from him, and the doubts regarding the traveler's safety were only set at rest when it was known that H. M. Stanley, the special

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correspondent of the New York *Herald*, had seen and assisted Livingstone at Ujiji, on Lake Tanganyika. They parted in March 1872, Livingstone going to explore the southern end of Tanganyika, and Stanley proceeding to Zanzibar. After another year's wanderings he was attacked with dysentery near Lake Bangweolo, and there he died. His body was buried in Westminster Abbey, having been conveyed to the coast, rudely preserved in salt, by his faithful followers. Consult: 'Livingstone's Last Journals' (1874); Stanley, 'How I Found Livingstone' (1873); Blakie, 'Livingstone's Personal Life' (1880); Hughes, 'David Livingstone' (1891); Johnston, 'Livingstone and the Exploration of Central Africa' (1897); MacLachlan, 'David Livingstone,' in 'Famous Scots' Series (1900).

Livingst'nia Mission. southern Africa, established in 1875 by the Free Church of Scotland, consists of two settlements with local branches. The first settlement was made at Cape Maclear at the southern end of Lake Nyassa, but the chief settlement is at Bandawé, on the west shore of the lake. The establishment of the mission was the result of a suggestion made by Livingstone (q.v.) that the shore of this lake was a good position for a mission that might counteract the slave trade which was carried on by the Arab, and Portuguese. The Church of Scotland established a mission at Blantyre, in the Shiré Highlands, near the lake. At Blantyre some manufacturing establishments have been established, a foundry, basket factory, cloth-mill (the cloth is made from the bark of trees), and a cotton factory. The Portuguese, in 1889, tried to get possession of the territory, but since 1890 the British have had possession.

Liv'ius Andron'icus, Roman poet, by birth a Greek of Tarentum. He first went to Rome at the commencement of the 3d century B.C. as instructor to the children of Livius Salinator. He introduced upon the Roman stage dramas after the Grecian model, and, besides several epic poems, wrote a translation of the 'Odyssey' in the old Saturine verse. Only a few fragments of his writings are extant.

Livo'nia, Livland, or Riga, Russia, a Baltic province, bounded north by Estonia, west by the Baltic Sea, south by Courland, and east by Vitebsk and the Lake of Peipus; length, 178 miles; breadth, 111 miles; area, about 18,158 square miles. The surface is for the most part flat, sandy, and swampy; the only hilly ground is in the districts of Venden and Dorpat. The government is well watered by the Dwina or Duna, and Embach; its principal lakes are the Vertserf and Luban. The climate is subject to extremes of heat and cold. Notwithstanding extensive tracts of sand, the greater part of the government is under cultivation, and yields good crops of oats, barley, wheat, potatoes, flax, and hops. The forests are extensive, and furnish good timber. Horses, cattle, and sheep are generally of small inferior breeds. Distilling, sugar refining, and the manufacture of tobacco, woollens, cotton, and linen, are the chief industries. The inhabitants consist of Livonians, of Russian, Swedish and German origin, who form the landed proprietors and governing class, and are divided into the nobility and bourgeoisie; and

Estonians and Letts, who form the peasantry, and though no longer serfs (having obtained their freedom in 1824), are bound to perform certain oppressive duties for the lords of the soil. The Estonians occupy the north and east portion of Livonia; the Letts the south and west. The Estonians are of the Finnish stock (see FINNS); the Letts, like the Lithuanians, belong to the Slavonic stock, and speak a language of their own (Lettish). Of the original inhabitants of the country, the Lives or Livonians proper, who are also of Finnish race, only a thousand or two are all that are left. The inhabitants are almost all Protestants of the Augsburg Confession. The capital is Riga. Pop. (1897) 1,300,640.

Livre, lē'ver, an ancient French coin, now superseded by the franc, to which it was about equal in value.

Livy (Titus Livius), Roman historian: b. Patavium (Padua) 59 B.C.; d. there 17 B.C. He spent most of his time at Rome, but kept aloof from active political life, although among his friends were numbered the most eminent men of his day. In spite of his republican leanings, he was befriended by Augustus, who counted him with Virgil and Horace, as one of the literary ornaments of his court. His principal work is the 'History of Rome' in 142 books (*Titi Livii ab Urbe Condita Libri*), which comprehends a period extending from the building of the city to the year 9 B.C. Only 35 of these books are extant, namely the first 10, which cover the period ending 293 B.C., and the 25 from the 21st to the 45th books, which comprehend the years between 218 and 167 B.C., as well as a number of fragments, and short abstracts, or tables of contents of all the books excepting the 136th and the 137th. Livy undertook this work, as he states in his preface, partly that he might plunge his mind into things of the past, and so forget the grievances of the present, and partly that he might spread out before his contemporaries a picture of the nation's ancestral glories. He has indeed produced a work which is truly national, which has always received the admiration and esteem of antiquity, and is in modern times regarded as one of the most precious relics of Latin literature. Since his time it has been the source of all knowledge of the period it deals with. He began its composition between the years 27 B.C. and 25 B.C., and published it from time to time in a series of detached parts; the present division into decades is of later origin. It appears that he was engaged upon his history up to the time of his death, but failed to carry it on to the end he had meditated, which would have included the death of Augustus. He had a practical object in view in the accomplishment of his task, but this was less to achieve a critical and scientific exploration of the past, than to produce a moving, lifelike, and readable representation of the time and country in which he lived. With this end in view he has chosen a style of his own; not the transparent splendor of Cicero, nor the condensed and epigrammatic pungency of Tacitus, nor the dilettante, though sometimes effective, archaism of Sallust. His narrative moves along with stately dignity; it teems with anecdote, and glows with patriotic emotion. He employs a phraseology remarkable for copiousness, for picturesqueness, for vivid description and occa-

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sionally for an eloquence that is burnished into poetic lustre. His materials must mainly have been derived from preceding annalists, but he weaves into his work the local traditions of a mythic age, and rivals Virgil in his love for the fables of Tuscany and Latium. His account of the Punic wars he draws from Polybius. We must not, however, expect to find in his writings a clear account of the origin and development of the Roman constitution. He seems to have cared little for the study of constitutional law, and even less for that of military art. Yet his political views were very decided, and in his account of the civil war, which resulted in the downfall of the Republic, he shows himself a strong partisan of the aristocratic party, so that Augustus did not hesitate to style him a Pompeian. The historic basis for the Roman history of Livy cannot be fully understood without reading the works of Niebuhr. Livy's complete works have been published by Gronov (1679); Drakenborch (1828); Zingerle (1883); and a translation of them appears in the Bohn Library. Fügner's "Lexicon Livianum" (1889) is important in Livian literature. Consult: Niemann, "Etudes sur la Langue et Littérature de Live" (1884); Taine, "Essai sur Tite Live" (1888); Madvig, "Emendations Livianae" (1877).

Liz'ard Point, or The Lizard, England, a headland in Cornwall, forming the southernmost point of Great Britain, 24 miles southeast of Land's End, and having two lighthouses with fixed lights 224 feet above sea-level.

Lizards, animal reptiles of the order *Lacertilia* which, together with the *Ophidia* (serpents), form the higher group *Sauria*. The one important character distinguishing lizards from snakes is the fact that the mandibles of the lower jaw are solidly united in the former and not in the latter. The lizards have generally two pairs of limbs, but one or both pairs may be absent (as in the amphisbaena), and the toes may vary in number from two to five. Though the front limbs may be wanting, the pectoral arch or bones of the shoulder-girdle are still represented; but when the hinder limbs are wanting, the pelvic arch also disappears. The spine is generally elongated, and a tail of considerable length is generally present. In most *Lacertilia*, the vertebrae are either hollow in front and convex behind (procoelous), or hollow at both ends (amphicoelous), the former condition being much more common than the latter. The cervical or neck-vertebrae may be furnished with ribs, and those of the back or dorsal region generally become united to the sternum or breast-bone. In the flying-lizard or dragon some of the hinder ribs become elongated and extended to form a support for the wing-membrane, by which this lizard is enabled to sustain itself in the air. The teeth are simple in structure, are not lodged in distinct sockets, and they generally become united to the jaw-bones with age. They vary much in form, from a toad-like plumpness to the slender shape of a snake. The food of lizards is generally insects, worms, and various small animals, but some live on vegetable substances. The eyes are provided with movable eyelids, while the ear is usually to be perceived externally. The skin is generally covered with scales or horny plates, although the integument—as in the chameleons, etc.—may

be soft; and the epidermis is shed in patches annually. In their reproduction lizards never undergo any metamorphosis, and are generally oviparous, but in some the eggs are retained until they hatch within the abdomen of the mother. Salivary glands are found which in *Heloderma* act as poison glands. The lungs are thin-walled sacs, from which terminal pouches may arise. The movement of the ribs assists in respiration. The lizards are most abundant in tropical regions, but are absent only from the cooler temperate and the frigid regions of the globe.

The *Lacertilia* are divided into three sub-orders, of which the following is an outline:

Sub-order 1. *Geckones*.—*Lacertilia* with four legs, amphicoelous vertebræ and clavicles dilated ventrally. The chorda persists and grows throughout life, in the centre of and between the vertebræ; the ribs are bifurcated, and dentition is pleurodont. Some species have mechanically adhesive disks. This is a very old group, modern species existing in tropical and southern European countries. See GECKO.

Sub-order 2. *Lacertæ*.—*Lacertilia* with procoelous vertebræ and the ventral part of clavicles not dilated. Eighteen families, as follows:

1. *Agamidae*.—A family of exclusively Old World lizards, containing some 200 species, among which the Malayan dragon (q.v.), and the frill-lizard (q.v.) are remarkable species. Many have a very chameleon-like appearance and are known in India and Ceylon as blood-suckers (genus *Calotes*). The desert lizards of North Africa and southwestern Asia are mostly of this family. See AGAMA.

2. *Iguanidae*.—A large and chiefly American family with pleurodont dentition, and a short, thick, non-protractile tongue. The genus *Anolis* contains the common "chameleon" of the southeastern United States. (See ANOLIS; CHAMELEON.) *Basiliscus*, of Central America has a great, erectile vestigial crest on the back and tail. (See BASILISK.) *Iguana* (q.v.) includes large edible lizards of Central and South America. *Phrynosoma* is the genus of the "horned toad" (q.v.), common in the arid region of the Great Plains and west to California. One of the most northerly species is the large, black, fat-bodied, bud-eating lizard of the sandy plains of southern California, known locally as Alderman lizard, or by the Indian name Chuckwalla; and scientifically named *Sauromalus ater*.

3. *Xenosauridae*.—A Mexican family intermediate between the *Iguanidae* and the *Anguidæ*; represented in Africa by (4) the *Zonuridae*.

5. *Anguidæ*.—Terrestrial pleurodont lizards, with bony plates in the skin and the tail long and brittle, dwelling in Central America, Europe and India. *Ophisaurus*, the genus of the glass snakes (q.v.) of the Central States, has the limbs reduced to mere spikes. *Anguis*, the "slow-worm" (q.v.), has no limbs at all, and the eyes well developed.

6. *Helodermatidae*.—Pleurodont, poisonous lizards of New Mexico and Arizona. See GILA MONSTER. The (7) *Lanthanotidae* are Asiatic representatives of the foregoing.

8. *Varanidae*.—Pleurodont aquatic lizards of the Old World, with bifid, protractile tongue. See MONITOR LIZARDS.

9. *Xantusiidae*.—Three Central American genera.

10. *Tejidae*.—A large tropical-American fam-

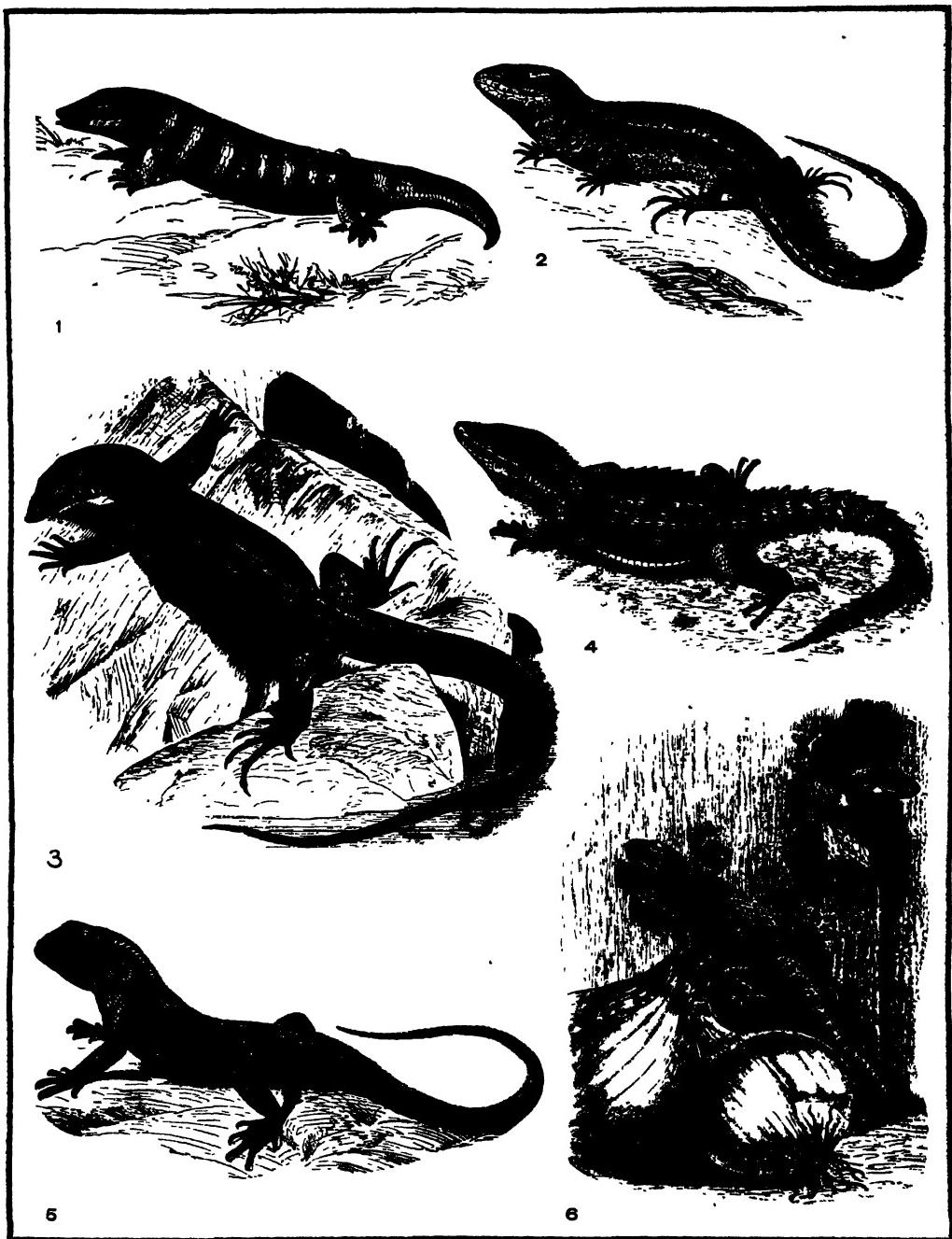
AMERICAN LIZARDS.



1. *Utanisodon umbra.*
3. *Surinam ameiva.*

2. *Teju or Tupinambis.*
4. *Gila Monster or Heloderma.*

OLD WORLD LIZARDS.



1. Skink.

2. *Lacerta ogilis*.

3. Nile Monitor or *Varanus*.

4. *Zonurus cordylus*.

5. *Agama colonorum*.

6. Wall gecko.

LLORENTE—LLOYD'S

Llorente, Juan Antonio Don, hoo-äñ' än-tó-né-ö dón lyō-rän'tä, Spanish historian: b. Rincon de Soto, Andalusia, 30 March 1756; d. Madrid 5 Feb. 1823. He studied theology at Tarragona and Madrid, was ordained priest in 1770; was doctor in canon law, chancellor of the University of Toledo; was commissary of the Inquisition at Logrono in 1785, and general secretary of the Inquisition at Madrid in 1789. He was commissioned in 1793 to draw up plans for a general reform of the procedure of the court. His greatest work is the 'Critical History of the Spanish Inquisition' (1815-17), which, however, has no authoritative standing among scholars. He wrote also 'Memoirs Relating to the History of the Spanish Revolution' (1815-19).

Lloyd, Ioid, Charles Harford, English musician: b. Thornbury, Gloucestershire, 1849. He displayed musical talent early, and at 10 was organist of Rangeworthy Church, and after 1862 studied music with Barrett of Bristol, confining his attention almost entirely to Bach and Beethoven. He was graduated from Oxford, where he came under the influence of Stainer, and definitely determined to make music his calling. He conducted the Gloucester musical festivals of 1877 and 1880, was organist of Gloucester cathedral in 1876 and of Oxford cathedral in 1882. Since 1892 he has been precentor and musical instructor at Eton. Among important compositions of his are the cantatas of 'Hero and Leander'; 'The Song of Balder'; 'Andromeda'; 'Alcestis'; 'Song of Judgment'; 'Long-beard's Saga.' He has also written many songs and much church music.

Lloyd, Curtis Gates, American mycologist: b. Florence, Ky., 17 July 1859. One of the founders of the Lloyd Library and collector of one of the most complete mycological museums in America. He is author of a series of bulletins on 'Mycological Notes'; and co-author of 'Drugs and Medicines of North America.' Mr. Lloyd has done much toward correcting existing errors respecting mycological species.

Lloyd, David Demarest, American playwright: b. New York 1851; d. Weehawken,

Lloyd, Ioid, David Demarest, American playwright: b. New York 1851; d. Weehawken, N. J., 1889. He was a brother of H. D. Lloyd (q.v.). He was graduated at the College of New York, and became a member of the staff of the New York *Tribune*. As a correspondent at Albany in 1875 he was prominent in exposing the canal ring. He was the author of four plays: 'For Congress' (1883); 'The Woman Hater' (1885); 'The Dominie's Daughter' (1887); 'The Senator' (1889).

Lloyd, Henry Demarest, American writer on economics: b. New York 1 May 1847; d. 28 Sept. 1903. He was graduated from Columbia University; lectured on political economy in New York schools; studied law, and was admitted to the bar in 1869. In 1872 he went to Chicago, where he was employed on the Chicago *Tribune* till 1885, the latter part of the time as a member of the editorial staff. His later life was devoted to writing. His publications include: 'A Strike of Millionaires against Miners, the Story of Spring Valley' (1890); 'Wealth against Commonwealth' (1894), a history of the growth and methods of the Standard Oil Company; 'Labor Copartnership' (1899), notes of visits to various co-operative shops and farms in Great Britain; 'A Country without Strikes'

(1900), an account of the history and workings of compulsory arbitration in New Zealand; and 'Newest England' (1900). He made the labor question his special field of research, and was an advocate of co-operation and a believer in socialistic—or, as he called it, democratic—control of industry, to which he maintained that social evolution was leading. He possessed the power of presenting economic facts in an unusually interesting manner, especially his 'Wealth against Commonwealth,' though compiled from court records and other official documents, is written with a force and vividness which give it real literary quality.

Lloyd, John Uri, American chemist and author: b. West Bloomfield, N. Y., 19 April 1849. He was educated in private schools; became professor of pharmacy at the Cincinnati College of Pharmacy, and held that position till 1887. He has been professor of chemistry in the Eclectic Medical Institute since 1878, and is now its president; and is associate editor of the 'Pharmaceutical Review,' the 'Eclectic Medical Journal,' and the 'Medical Gleaner.' He has made special studies in the dialect, superstitions, and folk-lore of northern Kentucky, is a member of many societies, contributor to chemical and pharmaceutical journals, and has written: 'Chemistry of Medicine' (1881); 'Etidorpha, the End of the Earth' (1895); 'The Right Side of the Car' (1897); 'Stringtown on the Pike' (1900); 'Warwick of the Knobs' (1901); 'Red Head' (1903); and, in collaboration, 'Drugs and Medicines of North America' (1884); 'King's American Dispensatory,' with King (1885-1900); 'Elixirs, their History and Preparation' (1892); 'A Study in Pharmacy' (1895).

Lloyd, Nelson McAllister, American journalist and author: b. Philadelphia 18 Dec. 1873. He was educated at the Germantown Academy, and graduated in electrical engineering at the Pennsylvania State College in 1892. Since then he has been engaged in newspaper work on the New York *Evening Sun*, of which he has been city editor since 1897. He has contributed many historical sketches and short stories to magazines, and has also published 'The Chronic Loafer' (1900); and 'A Drone and a Dreamer' (1901).

Lloyd's, an incorporated firm engaged in marine insurance in London, or otherwise connected with shipping, having rooms in the London Royal Exchange. Members are admitted by subscription, and the affairs of the institution are conducted by a committee. Reports are received daily from all foreign ports, and this information is posted in the common or merchants' room. Besides this, there are other rooms for the use of the underwriters and for ship-auctions, a library, restaurant, etc. Lloyd's list, containing shipping reports, is published daily, and various other publications relating to shipping are also issued. Lloyd's Registry is an independent association for the classification of shipping according to character and efficiency. Lloyd's Register of Shipping is issued annually, and the society maintains a large staff of surveyors, who inspect and report upon vessels both when built and afterward. Originally the London underwriters met at Lloyd's Coffee-house, hence the name.

LLOYD'S BONDS—LOBBY

Lloyd's Bonds, in England, from 1850 to 1870 a well known commercial security; mostly instruments under the seal of a railway or other such company admitting the indebtedness of the company to a specified amount, with a covenant to pay such amount with interest within a stated time. These companies had generally statutory authority to borrow only when a certain amount (usually the whole) of their capital had been subscribed and a specified portion paid up; their power of borrowing must also be exercised with the sanction of a general meeting. Such restrictions were severely felt by companies whose works were being constructed. A barrister, J. H. Lloyd, relieved the companies from this embarrassment by taking advantage of the fact that companies, though prevented in such cases from borrowing, could contract debts in any other way, and acknowledge their obligations in various forms. He introduced a form in which such acknowledgments would become almost as binding on the grantors as a statutory debenture, and so become sufficiently marketable.

Loach, lōch, a small cyprinoid fish of the genus *Cobitis*, which are favorite objects of quiet angling in Europe, and are good to eat. Loaches are closely allied to barbels.

Load Line, a line drawn upon the side of a ship to indicate when she is properly loaded, or if overloaded. This is quite essential, as many vessels are lost at sea, the result of overloading. The abbreviations used in designating the load line are as follows:

FW., fresh water load-line (steamer).
IS., summer load-line, Indian Ocean.
S., summer.
W., winter.
WNA., winter, north Atlantic.
F., fresh water sailing ships.

These marks are painted on iron or steel ships, and cut into the wood on wooden vessels.

Loadstar. See LOESTAR.

Loam, a soil which consists of a natural mixture of sand and clay (see SOILS); in founding, a mixture of sand and clay with straw, sawdust, etc. (called casting-loam), usually made by mixing the requisite materials in a mill similar to a pug-mill. In molding, it is used wet, like plaster, but is dried perfectly before pouring. It must be plastic while wet, and must have strength and solidity when dry, with power to resist high temperatures.

Loan, anything lent or given to another on condition of return or payment. In law loans are considered to be of two kinds—*mutuum* and *commodate*; the former term being applied to the loan of such articles as are consumed in the use, as provisions or money; the latter to the loan of such articles as must be individually returned to the lender. The acknowledgment of a loan of money may be made by giving a bond, a promissory note, or an I. O. U. (q.v.).

Loanda, St. Paul de. See ST. PAUL DE LOANDA.

Loango, lō-äng'gō, Africa, a maritime country in the southwest, extending along the Atlantic from the equator south to the river Kongo, and belonging chiefly to France, with parts to Portugal and the Kongo State. The hills are covered with luxuriant vegetation. The lakes and rivers abound with fish, and the forests with game. The finest fruits grow wild,

and the sugarcane attains an enormous size. Palm-trees are numerous, and the potato and yam abundant. The climate is equatorial and domestic animals do not thrive. Loango, the chief place, a French port, is a collection of huts and business buildings.

Lob-Nor, Central Asia, a lake of the Gobi Desert, in Eastern Turkestan, which receives through the river Tarim the waters of a large number of streams. It was first explored by Prjevalsky in 1877, and seems to be a flooded morass of salt and brackish water rather than a lake proper, its area and shape varying greatly at different times.

Lobby, The, a class of persons who seek to influence legislation outside of the regular legislature. The term was originally applied to the waiting-rooms of legislative halls, and then to those persons who frequented these rooms for the purpose of interviewing legislators with a view to influencing their votes. The lobby includes both those who are regularly employed in the work, and those who on particular occasions wish to promote or oppose some specific legislation. All large corporations and firms have regular paid lobbyists at Washington and at State capitals where legislation is likely to affect their interests. Women as well as men are employed as lobbyists, and are said to be very successful. The lobby is not in theory, nor necessarily in practice, a corrupting agency. It may furnish an entirely legitimate and desirable method of giving legislators necessary information in regard to certain laws; but it may also be, and often is, the means of obtaining legislation in the interests of a few without regard to the public good. The methods of the lobby differ with the character of the lobbyist and of the legislator approached. They vary from the legitimate presentation of facts and argument in regard to a law to the use of bribery, threats of preventing re-election, etc.; and include the obtaining of letters and petitions from constituents, the employment of press articles, and social attentions. The successful lobbyist must thoroughly understand the men with whom he has to deal and the methods of legislation; it has been found, therefore, that former members of the legislature make the most successful and sometimes the most dangerous lobbyists. The dangers of the lobby are due to three chief causes: (1) the large number of special and private bills, all of which can not be fully considered at the regular sessions; (2) the system of referring all bills to committees, and accepting, as a rule, the report of the committee, so that the lobbyist has practically but few men to deal with; (3) the secrecy which attends the work of the lobby, giving the public no effective means of knowing or dealing with its evils. To oppose the grosser evils of the lobby both Federal and State laws attach heavy penalties to giving or taking a bribe for legislation. Many of the States also have lessened the number of bills to be presented by forbidding in their constitutions the passing of special acts in certain cases. Massachusetts has sought to lessen the secrecy by requiring every promoter of a law in the interest of others to be registered, with the name and address of his employer and a statement of the matter on which he is employed. This law has had the effect of giving legal sanction to the lobbyist's work, improving the char-

LOBELIA—LOBSTER

acter of the lobbyists, and of lessening, though not entirely preventing, the evils attending secrecy.

Consult: Bryce, "American Commonwealth"; Bridgman, "The Lobby" (in "New England Magazine," n. s. Vol. XVI., p. 151); Tanner, "The Lobby and Public Men."

Lobe'lia, a genus of annual and perennial herbs and a few sub-shrubs of the order Lobiaceæ, closely allied to the harebells. More than 200 species are distributed throughout the temperate and tropical zones, especially in damp soils. They are characterized by alternate, usually narrow leaves and two-lipped tubular flowers (three petals forming one lip and two the other), arranged in terminal racemes. Several of the species are highly prized as garden plants, the best known being the cardinal-flower (q.v.), the great lobelia (*L. syphilitica*), both common natives in marshy grounds and along streams; *L. erinus*, a favorite African plant for edging flower beds; and *L. fulgens*, a Mexican species, which like the first named has brilliant red flowers. The other two generally have blue blossoms. They are all of simplest culture. Some species have been used in medicine, and one common species, *L. inflata*, is called Indian tobacco because its dried leaves were extensively smoked by the southern Indians, who enjoyed the narcotic effect in spite of the bitter flavor. Lobelin, lobelacrin and lobelic acid are organic derivatives.

Lobengula, lō-bēng-goo'lā, king of the Matabeles (see MATABELELAND): b. about 1833; d. 1894. He was a son of Mosilikatse, whom he succeeded in 1870. Fixing his capital at Bulawayo (q.v.), he made himself a powerful opponent of Western civilization, and prohibited his people, on pain of death, from accepting Christianity. After years of diplomatic effort, following the discovery of gold in his domains, Great Britain, by treaty in 1888, acquired suzerainty over his kingdom, and in 1890 the British South African Company obtained from him permission to settle in Mashonaland (q.v.), paying him a stipulated rent. After preparing to hold the country and work the gold mines, the company provoked the enmity of Lobengula, who began against the English a war which resulted in his disastrous defeat, after shocking slaughter of his men by Maxim guns. Bulawayo was taken, and Lobengula fled. During his flight he ambuscaded and killed Maj. Wilson and a British detachment, but the contest ended with his own death.

Lob'lolly Bay, or **Tan Bay**, an elegant pyramidal shrub or tree (*Gordonia lasianthus*) of the tea family, which covers considerable tracts of swampy coast along the Gulf of Mexico. It is a handsome tree, sometimes 50 or 60 feet tall, with evergreen leaves and large white fragrant flowers. Its bark is used in tanning.

Loboc, lō-bōk', Philippines, a pueblo of the province of Bohol, situated in the southern part of the province on the Socar-Vilar-Loay River, three miles from its outlet, and 12 miles east of Tagbilaran, the provincial capital. It is on the road leading from the coast. Pop. 10,200.

Lobos, lō'bōs, or **Seal Islands**, Peru, three islands in the Pacific, 12 miles from the mainland, so named from the Spanish *lobo*, "seal," large numbers frequenting the islands. They

were famous for their extensive deposits of guano, which have been depleted.

Lob'ster, the name of certain large crustaceans of the crab group, and especially of the genera *Homarus*, *Nephrops*, and *Palinurus*. To the first belong the common European and American lobsters (*Homarus gammarus* and *americanus*). *Nephrops* differs chiefly in possessing 19, instead of 20, pairs of gills, and its most important species is the Norwegian lobster (*N. norvegicus*). To *Palinurus* belongs the rock-lobster or marine crayfish (*P. vulgaris*) of Europe, as well as some tropical species, all of which differ from the common lobster in the absence of the large claws, while they possess long rigid antennæ and spiny shells. A large and handsome species of this group is abundant in West Indian waters.

The American lobster is found along the western Atlantic coast from Delaware to Labrador; from the shore to a depth of 100 fathoms. It is most abundant on the shores of Maine and Nova Scotia and uncommon on the New Jersey coast. Though living amid a variety of surroundings, the lobster prefers rocky bottoms, on which it reaches the greatest size and abundance, probably a direct result of a more plentiful food supply. Like many fishes, but to a much less degree, the lobster is migratory, moving into shallow water in the spring and returning to greater depths as the water grows colder in the fall. This habit, however, is very far from being universal and many lobsters remain in shallow waters throughout the year. The food of the lobster consists of all kinds of animals, both living and dead, and to a less extent of vegetable matter, the indigestible parts of which are regurgitated. At times they are cannibalistic. Although so well protected by their hard shells, powerful claws, and burrowing habits, lobsters have many enemies besides man. The most important of these are bottom-feeding fishes, such as the cod, tautog, skate and dogfish, which destroy great numbers of young lobsters when 2 to 6 inches long, as well as the egg-bearing females and moulting adults. During the free-swimming larval stages great numbers probably fall a prey to surface-feeding fishes like the menhaden and herring, though little direct proof of this exists. The number of eggs produced by a female lobster varies from 3,000 to nearly 100,000, according to the size and age of the animal, maturity being attained at an age of 3 or 4 years and a length of about 8 to 12 inches. The great majority (about four fifths) lay their eggs during the summer, the remainder during the fall and winter, and it is probable that each female lays once in two years. After extrusion the eggs are borne on the appendages attached to the lower side of the abdomen or tail of the female, where they remain undergoing a slow development for 10 or 11 months, most of those laid during the summer hatching in June of the following year. After hatching, the young passes a period of 6 to 8 weeks as a free-swimming pelagic larva, which moults 5 or 6 times, with corresponding changes in form and color. By this time it has assumed the form of the adult and is about three fourths of an inch long. It now sinks to the bottom and burrows into the gravel or hides in rock crevices near shore. At the end of the first year it is about 4 or 5 inches

LOBWORM—LOCK

long and has moulted from 14 to 17 times, after which growth is much less rapid and moulting less frequent. The rate of growth varies greatly according to the food supply and other conditions, but a lobster of 10 or 12 inches is about 5 years old. A great age and size are sometimes attained, individuals weighing upward of 40 pounds being recorded, though even 25 pounds is very rarely reached.

The toothsomeness of the American lobster was early recognized and a regular fishery has existed on the Massachusetts coast for nearly a century. Owing to a rapidly extending depletion of the fishing-grounds and a consequent diminution in the size and number of lobsters, the centre of the fishery has shifted northward, first to Maine and then to the British provinces. The lobster fisheries of the United States in 1901 employed 4,348 persons, 4,151 vessels and boats and 208,563 lobster-pots, representing an investment of \$1,668,060, nearly three fifths of which is credited to Maine. The yield was 15,767,741 pounds, valued at \$1,390,579, of which 12,346,450 pounds were taken in Maine. After about 1885 the yield declined steadily, but the value of the product increased. As measures toward maintaining the lobster supply, laws have been enacted fixing fines for the possession of egg-bearing lobsters or those below a specified minimum size, and recourse has been had to artificial propagation. In the latter practice many millions of eggs are annually taken from the bearing lobsters, artificially hatched, and the larvae distributed by the fish commissions of the United States and the British Provinces. In 1902 our Bureau planted upward of 81,000,000 of fry, and the Canadian government operates on an even more extensive scale. The beneficial results have been scarcely apparent, but the recent successful rearing of lobsters beyond the larval stages has introduced a more hopeful outlook. The methods of the lobster fishery are very simple and uniform. Use is made of a trap or pot, a box-like affair generally made of laths placed about one inch apart, and with a funnel-shaped opening of coarse netting placed in one end. The pot is baited with otherwise useless fish, weighted with stones, and lowered to the bottom by means of a rope to the upper end of which a buoy, with the owner's private mark affixed, is attached. The pots are visited daily, and the lobsters, which after entering are unable to find their way out, removed. They are kept alive in floats until a sufficient number for shipment has been gathered. Besides those sold in the shells, large quantities of the meat are canned, particularly at Portland.

Consult especially the elaborate account of the American lobster by Herrick, in 'Bulletin of the U. S. Fish Commission' for 1895, in which full bibliographical references will be found.

Lob'worm. See LUGWORM.

Local Government. See MUNICIPAL GOVERNMENT.

Local Option, or local control of the liquor traffic; a term applied to the principle by which a certain majority of the inhabitants or taxpayers of a certain locality, town, county or State, may decide as to whether any, or how many, places for the sale of intoxicating liquors shall exist in the locality. What considerations should determine a locality, who should be the

constituents, what should be the majority necessary to vote the abolition of licenses, and whether the trade thus affected should receive compensation or not, are points not as yet satisfactorily settled. This principle operates in several localities in the United States with varying success from the prohibition or temperance point of view. Local option in the States of Maine and Kansas has resulted in restricted laws governing the liquor traffic. Many small towns and villages have adopted local option with more or less satisfactory results. The words "local option" had their origin with the temperance reformers who have sought to secure power and authority enabling them to regulate the liquor traffic, either by maintaining unchanged, increasing, diminishing, or wholly suppressing the houses for the sale of intoxicating liquors.

Loch Lomond. See LOMOND, LOCH.

Lochleven. See LEVEN, LOCH.

Lock, a mechanical appliance used for fastening doors, chests, etc., generally opened by a key. The lock is reckoned the masterpiece in smithery, a great deal of art and delicacy being required in contriving and varying the wards, springs, bolts, etc., and adjusting them to the places where they are to be used, and to the several occasions of using them. The principle on which all locks depend is the application of a lever to an interior bolt, by means of a communication from without; so that, by means of the latter, the lever acts upon the bolt, and moves it in such a manner as to secure the lid or door from being opened by any pull or push from without. The security of locks in general, therefore, depends on the number of impediments we can interpose betwixt the lever (the key) and the bolt which secures the door; and these impediments are well known by the name of wards (which slip into corresponding grooves of the key), the number and intricacy of which are supposed to distinguish a good lock from a bad one. If these wards, however, do not in an effectual manner preclude the access of all other instruments besides the proper key, it is still possible for a mechanic of equal skill with the lockmaker to open it without the key, and thus to elude the labor of the other. Another kind of impediment is the tumbler, which is a small projecting piece of metal carried on a latch, and which rests in a notch cut in the bolt, and can only be raised by application of the proper key. Various complicated and difficult locks have been constructed. In a very ingenious lock, invented in England, 24 small blocks of metal, of different sizes, are introduced, corresponding to the letters of the alphabet. Out of these an indefinite number of combinations may be made. The person locking the door selects and places the blocks necessary to spell a particular word, known only to himself; the act of locking or throwing out the bolt produces the particular arrangements in the internal parts of the lock, and no other person, even if in possession of the key, can open the door without a knowledge of the same word.

The padlock, in which the lock is a separate arrangement, is precisely similar to other locks except in shape. It has also a movable bow which is hooked into a staple or other fastening and then locked. Locks for drawers, cupboards, and the like, which only require to be opened on one side, are generally made with a central pin

LOCK HAVEN—LOCKE

on which the key, with a pipe, works; but in locks which must be opened from both sides this arrangement is impossible, and the key is solid, working through a hole in the lock. It must, however, be symmetrical, so as to exactly reach the turning place of the lock from either side. Locks which are mortised into the thickness of the door are called mortise locks. Many ingenious automatic latches have been invented for cabinets and the like, which shut of themselves when the door is closed, and can be pulled open without a key or turning a handle; they are used when security is not required, only a means of keeping the door closed.

For Lock in firearms, see MUSKET; REVOLVER; RIFLE.

Lock Haven, Pa., city, county-seat of Clinton County; on the Susquehanna River and on branches of the Beech Creek and the Pennsylvania R.R.'s; about 68 miles northwest of Harrisburg. The first settlement was made in 1769 and, in 1833, it was incorporated as a town. In 1844 it was made a borough, and in 1870 received its city charter. It is situated in an agricultural and lumbering region. Its chief industrial establishments are lumber and planing-mills, tanneries, cigar-box factory, cigar factory, foundries, sewer-pipe works, fire-brick works, silk-mill, breweries, paper-mill, and furniture factory. The State Central Normal School is situated here. Some of the prominent buildings are the court-house, a hospital, and several of the churches. The city has a circulating library containing about 6,000 volumes. Pop. (1900) 7,210.

Locke, Lök, David Ross ("PETROLEUM V. NASBY"), American humorist and satirist: b. Vestal, Broome County, N. Y., 20 Sept. 1833; d. Toledo, Ohio, 15 Feb. 1888. He learned the trade of printer and after being connected with several newspapers was editor and owner of the Toledo *Blade* in 1865, and very soon became popular as a humorous writer and later as a lecturer. He began his "Nasby" letters in the Findlay "Jeffersonian" in 1860 and continued them throughout the Civil War. They exercised much influence in molding popular opinion, upholding as they did the policy of the Lincoln administration. In later years the satire of the letters, which still continued to appear, was aimed at President Johnson and his peculiar methods. They were collected and published in book form under the titles "Divers Views, Opinions, and Prophecies of Yours Truly" (1865); "Swingin' Round the Kirkle" (1866); "Ekkoes from Kentucky" (1867); "The Struggles—Social, Financial, and Political—of P. V. Nasby" (1872). He also published "Hannah Jane"; "The Moral History of America's Life Struggle"; "The Morals of Abou Ben Adhem."

Locke, John, English philosopher: b. Wrington, Somerset, 29 Aug. 1632; d. Oates, Essex, 28 Oct. 1704. He was the son of an attorney who was also a captain in the Parliamentary army. Locke was educated at Westminster School and at Christ Church, Oxford, where he was graduated and took his bachelor's degree in 1656, two years later took the degree of M. A., and entered upon the study of medicine. He lectured at Oxford (1661-4) on Greek, rhetoric, and philosophy, and during this period became interested in experimental phys-

ics, especially chemistry and meteorology, and in metaphysics showed a preference for studying Descartes, although his own philosophy powerfully antagonizes that of the French master. Theology and politics, including diplomacy, also engaged his attention. At Oxford before 1666 he is said to have practised medicine, in which, however, he was never graduated. As secretary to Sir Walter Vane, British envoy, he went in 1665 to Cleves, Prussia, returning to Oxford in the following year, during which time he made the acquaintance of Lord Ashley, afterward 1st Earl of Shaftesbury, became his family physician and secretary, under his patronage held various offices, and in 1682 accompanied him in his retirement to Holland. Locke continued to reside abroad until 1689, when the revolution had been accomplished, then returned to become commissioner of appeals. His association with Lord Ashley, between whom and himself there was close intellectual sympathy, was stimulating to his genius, and it was in Ashley's house that Locke first planned the "Essay on the Human Understanding." Fully elaborating this work during his voluntary exile, he published it in complete form in 1690, with a dedication to the Earl of Pembroke, whose acquaintance he had made at Montpellier many years before. The "Essay," which had largely occupied him for almost 20 years, met with much objection in England, being particularly opposed at Oxford; but on the Continent it brought him great celebrity, and was translated into French and Latin, and later into other languages. For the copyright of the first edition he received but £30, and although he had previously published two works this was the first to bear the author's name. In 1695 Locke was made a commissioner of trade and plantations, but in a few years became incapacitated and retired, and from 1700 until his death lived with his friend, Sir F. Masham, at Oates. Meanwhile being drawn into the violent controversies over the essay which arose among different sects and schools, he had sturdily maintained his ground in a style of epistolary polemics which still possesses an academic interest.

As a philosopher Locke's place is usually fixed at the head of the English Sensational School, although this classification by no means does justice to his many-sidedness as a thinker, and the term "sensationalism," with its ordinary connotations, is wholly inadequate for a correct representation either of his speculative inquiries or of those still less definable meditations which led him profoundly to search the realms of ethics and of spiritual laws, in an endeavor to assign the relations and functions of these in the world of practical politics and that of instituted religion. Of that sensationalist school of which he is reputed to have been founder, it has been said with much pertinence that its ultimate conclusions are such as "his calm and pious mind would have indignantly repudiated." The "Essay on the Human Understanding" holds a permanent place among the greater works of philosophy, in the history of which, however, Locke's method may be superseded, and although his main doctrine be exploded, the book retains its importance as an epoch-marking achievement. It seeks the primal sources and the scope of human knowledge, denying the existence of innate ideas, presenting the mind as a sheet of white paper prepared to

LOCKE — LOCKPORT

be written upon by experience, which alone supplies the knowledge there impressed, and tracing the sources of all ideas to what he calls sensation and reflection. This doctrine of the *tabula rasa* or white paper found a vigorous controverter in Leibnitz (q.v.). The opposition which Locke thus represented between all intuitional and experiential philosophies still remains a central point of dispute among thinkers of various schools, but he was a forerunner in psychology, as he was also in the advocacy of civil and religious liberty, for which he suffered persecution and betook himself to exile.

Upon questions of government Locke was in the main a follower of Hobbes (q.v.) in so far as the latter regarded governmental authority as something delegated by the subjects for the creation of the state, through a compact which carried in itself the principle of obligation. But he went far beyond Hobbes in the application of his views to the concrete affairs of politics. In 1689 a constitution for the Carolina colonists was drafted by him, and was an evidence of his concern to put political philosophy to practical service. Besides the 'Essay,' his works include letters 'Concerning Toleration' (1689); 'Two Treatises on Government' (1690); 'Some Thoughts Concerning Education' (1693); 'The Reasonableness of Christianity'; and a little book 'On the Conduct of the Understanding,' posthumously published. Frazer's edition of the 'Essay' (1894) is the most desirable. His philosophical writings have been published in various editions, Saint John's (1854 et seq.) being one of the most useful. Consult: King, 'The Life of John Locke' (1829); Fox Bourne, 'The Life of John Locke' (1876); Fowler, 'John Locke' (1880); Frazer, 'Locke' (1890); Russell, 'The Philosophy of Locke' (1891); and Ueberweg-Heimze, 'Grundriss der Geschichte der Philosophie' (8th ed., 1896), where a more extended bibliography is to be found.

Locke, William John, English novelist: b. 20 March 1863. He was educated at Queen's Royal College, Trinidad, and Cambridge University, and is now (1903) secretary of the Royal Institute of British Architects. His fictions include 'At the Gate of Samaria' (1895); 'The Demagogue and Lady Phayre' (1896); 'A Study in Shadows' (1896); 'Dereelicts' (1897); 'Idols' (1898); 'The White Dove' (1900); 'The Usurper.' These have been reissued in the United States. He has also written two plays, 'Mr. Cynic,' played in 1899, and 'The Lost Legion' (1900).

Lock'er-Lamp'son, Frederick, English lyric poet: b. Greenwich 29 May 1821; d. Rowfant, England, 30 May 1895. He wrote a volume of "society verses" greatly admired for their grace and finish, 'London Lyrics' (1857); edited an anthology, 'Lyra Elegantiarum' (1867); and wrote a collection of miscellanies entitled 'Patchwork' (1879). In 1874 he married for his second wife the daughter of Sir Curtis Lampson and took her name in addition to his own. Consult 'My Confidences,' his autobiography (1896).

Lockhart, lök'ärt, John Gibson, Scottish editor and biographer: b. Cambusnethan, Lanarkshire, 14 July 1794; d. Abbotsford 25 Nov. 1854. He was graduated at Glasgow and Oxford universities and became a member of the

Scottish bar. He never practised as an advocate, but devoted his time to literary pursuits. In 1817, with Professor Wilson, he established 'Blackwood's Magazine,' a Tory organ, which at the outset created an immense sensation by the ability and keen satire displayed in many of its articles. In 1820 Lockhart, who had previously become a favorite with Sir Walter Scott, married his eldest daughter, and much of his future life took its color from this connection. In 1826 he succeeded Gifford in the editorship of the 'Quarterly Review,' and continued in the position till 1853. His translations of 'Spanish Ballads,' originally contributed to 'Blackwood,' were collected in 1823. He also published the novel 'Valerius' (1821); 'Reginald Dalton' (1823); 'Adam Blair' (1822); and 'Matthew Wald' (1824); 'Life of Robert Burns' (1828); 'Life of Sir Walter Scott' (1839-41). This last, though indebted for much of its interest to its subject, is on the whole written, notwithstanding occasional prolixity, with taste and judgment. Lockhart, for his steady attachment and important services to the Conservative party, was rewarded in 1843, by Sir Robert Peel, with the appointment of auditor of the duchy of Lancaster. He was buried in Dryburgh Abbey, close by Sir Walter Scott. Consult: Lang, 'Life of John Gibson Lockhart' (1896).

Lockhart, lök'härt, Texas, town, county-seat of Caldwell County; on the Missouri, K. & T., and the San Antonio & A. P. R.R.'s; about 28 miles south of Austin and 140 miles west of Houston. It is situated in a fertile agricultural section in which cotton and live-stock are raised extensively. Some of its industrial establishments are a soap-factory, cotton-gins, cottonseed-oil mill, wagon and carriage factory, cotton-compress, stock-yards, grain-elevators, and lumber-yards. Pop. (1900) 2,306.

Lockjaw. See **TETANUS**.

Lock'out, the discharge and keeping out of employment of artisans and laborers by their employers. It is a retaliatory measure adopted by some capitalists to resist the demands for shorter hours, more pay, etc., made by their workmen. The workmen may themselves be responsible for a lockout, just as an employer may be responsible for a strike upon the part of his workmen. See also **STRIKES**.

Lock'port, N. Y., city, county-seat of Niagara County; on the Erie Canal, and on the Erie, the Buffalo & L., and the New York C. R.R.'s; 12 miles from Lake Ontario, 20 miles east of Niagara Falls, and about 25 miles north by east of Buffalo. It was settled in 1823 by workmen who were employed on the Erie Canal. On 26 March 1829 it was incorporated as a village, and became a city 11 April 1865. It is situated in a fertile agricultural region; but the extensive water-power obtained from the canal has made it an important manufacturing city. The 10 large locks of the canal, which here make a descent of 66 feet, have given name to the city. The canal passes through a deep cut, an excavation in the solid rock, several miles in length. The New York Central Railroad bridge, 500 feet long, crosses the canal here, at a height of 60 feet above water. There are large sandstone and limestone quarries in the vicinity.

LOCKROY—LOCKYER

The chief manufactures are pulp and paper, Holly waterworks machinery, wood-work machinery, machinery for flour mills, glass, rolling-mill products, cotton-batting, wagons and carriages, brooms, flour, indurated fibre, aluminum, cotton and woolen goods, and creamery products. Lockport has 20 large manufacturing establishments, which have nearly 12,000 employees. In addition to the trade in manufactured articles, the city has an extensive trade in the quarry products, and in grain and fruits. It has (1903) four banks, with a combined capital of \$3,500,000. Some of the prominent buildings are the high school, the new government building, and the court-house. It has 19 churches and good public and parish schools. It is the seat of Saint Joseph's Academy. The city owns and operates the waterworks. The government is vested in a mayor and a council of 10 members, elected annually. Pop. (1900) 16,581. Consult Pool, 'Landmarks of Niagara County.'

T. T. FEELEY,
Editor 'Review.'

Lockroy, Edouard Etienne Antoine Simon, à-doo-är à-tē-én à-n̄-twan sē-mōn lök-rwa, French journalist: b. Paris, France, 18 July 1838. He took part in Garibaldi's Sicilian expedition and was prominent as a journalist before and after the war with Germany. On account of his radical articles published in 'Figaro,' 'Le Rappel,' and 'Le Peuple Souverain,'—a popular political journal, of which he was editor,—he was imprisoned for a few months in 1872 and again in 1873. He entered the Assembly in 1873, there voting with the extreme Left. He was minister of commerce (1886-7), and of public instruction (1888). His published volumes of collected newspaper articles include: 'The Eagles of the Capitol' (1869); 'Down with Progress' (1870); 'The Commune and the Assembly' (1871); 'The Rebel Island' (1877); 'Von Moltke' (1891), memoirs; 'A Mission in the Vendée, 1793' (1893).

Locks, Canal. See CANALS.

Locksley Hall, a well-known poem by Lord Alfred Tennyson (q.v.), first published in 1842.

Lockwood, Belva Ann Bennett, American lawyer and reformer: b. Royalton, N. Y., 24 Oct. 1830. She was graduated from Genesee College, Lima, N. Y., in 1857, and taught school 1857-68. She was married in 1848 to Uriah H. McNall (d. 1853), and in 1868 to Dr. Ezekiel Lockwood. She studied law at Washington, and was admitted to the bar in the District of Columbia in 1873. Before that time she had secured the passage of a bill giving women employees of the government equal pay for equal work; in 1879 she obtained the passage of a bill permitting women to practise before the United States Supreme Court, and was admitted under this law in the same year. She has been engaged in many important law cases, some before the Supreme Court, and was one of the attorneys in the probate of the will of Myra Clarke Gaines. She has also been active in temperance, peace, and woman suffrage movements; has been secretary of the American branch of the International Peace Bureau; and in 1884 and 1888 was the nominee of the Equal Rights Party for President of the United States. In 1896 she was commissioned by the Secretary of

State to represent the United States at the Congress of Charities and Corrections in Geneva, Switzerland; in 1901 she was elected president of the Women's National Press Association. She has for several years been interested in the claims of the North Carolina Cherokee Indians, and in 1900 had a bill before Congress to prevent encroachment upon their territory. She also prepared an amendment to the Statehood Bill before Congress in 1903, granting suffrage to women in Oklahoma, Arizona, and New Mexico.

Lockwood, Henry Hayes, American soldier, tactician, and educator: b. Kent County, Del., 17 Aug. 1814; d. Washington, D. C., 7 Dec. 1899. He was graduated from West Point in 1836, served as lieutenant of the 2d artillery in the Seminole war in Florida (1837), resigned from the army and undertook agriculture in Delaware. In 1841 he became professor of mathematics in the United States navy, in 1845 of natural philosophy at the Naval Academy, where he was professor of artillery and infantry tactics in 1845-61, and of astronomy and gunnery in 1851-61. He entered the Civil War as colonel of the 1st Delaware infantry, on 8 Aug. 1861 was promoted brigadier-general of volunteers, at Gettysburg commanded a brigade of the Twelfth corps, and in 1863-4 was commander of the Middle Department. Subsequent to the war he was professor of natural philosophy at the Naval Academy, and in 1871-6 was connected with the Naval observatory. He published 'A Manual for Naval Batteries' (1852), and 'Exercises in Small Arms and Field Artillery, arranged for Naval Service' (1852).

Lockwood, Ingersoll, American author: b. New York 1841. Besides such works for juvenile readers as 'The Travels of Little Baron Trump'; 'Wonderful Deeds of Little Giant Roab'; 'Extraordinary Experiments of Little Captain Doppelkopp'; and 'Baron Trump's Journey Underground,' he has written 'Legal Don'ts'; 'Private Letters of a French Woman'; etc.

Lockwood, James Booth, American soldier and Arctic explorer: b. Annapolis, Md., 9 Oct. 1852; d. Cape Sabine, 9 April 1884. He entered the army as 2d lieutenant in 1873, and served till 1880 in the West. He volunteered to accompany the Lady Franklin Bay expedition to the Arctic regions and was made second in command. His fame rests on the discovery of Lockwood Island, in lat. 83° 24' N., the farthest northern point of land or sea up to that time. His body was brought to the United States and interred in the grounds of the Naval Academy. Consult Lanman, 'Farthest North' (1885).

Lockyer, lök'yér, Sir Joseph Norman, English astronomer: b. Rugby 17 May 1836. He was educated privately, entered the War Office in 1857, and in 1870 was appointed secretary of the royal commission on the advancement of science. Five years later he became astronomical lecturer at South Kensington, and since 1881 has been professor of astronomical physics in the Royal College of Science. He directed the eclipse expedition to Sicily in 1870, and to India in 1871, and he subsequently directed many others, including those of 1896 and 1897. In 1874 he was awarded the Rumford medal of the Royal Society, and became editor of 'Nature,' a post which he still holds, and was knighted in

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1897. He is best known as a popular lecturer on science, and in connection with his discoveries in spectrum analysis. He has published: 'Elementary Lessons in Astronomy' (1870); 'Contributions to Solar Physics' (1873); 'The Spectroscope' (1873); 'Primer of Astronomy' (1874); 'Studies in Spectrum Analysis' (1878); 'Star-Gazing' (1878); 'Chemistry of the Sun' (1887); 'The Movements of the Earth' (1887); 'The Meteoritic Hypothesis' (1890); 'The Dawn of Astronomy' (1894); 'The Sun's Place in Nature' (1897); 'Recent and Coming Eclipses' (1897); 'Inorganic Evolution' (1900).

Loco-Fo'cos. In United States history, a political nickname applied to the equal rights or radical faction, 1835-7, of the Democratic party, properly of New York, though the name was afterward made national. During the Federalist control of the government, the method of granting bank charters and controlling banks was charged by the opposing faction with favoritism and corruption. Upon their gaining control, things did not, in the opinion of many, improve; and in 1835 there was formed in New York the "Equal Rights party," opposed to special privileges in granting bank charters to corporations. At a meeting in Tammany Hall, 29 Oct 1835, the regular Tammany Democrats tried to gain control. Finding themselves outnumbered they turned out the lights and retired. The Equal Rights men produced candles and "Loco-foco" matches, and continued the meeting. Hence the name. This party was beaten at the elections, but nevertheless exercised considerable influence in national affairs for several years. For a time the name was shortened into "locos."

Lo'co-weed, or Loco-vetch. See CRAZY WEED.

Locomo'tion, Animal. See FLIGHT; SWIMMING.

Locomotive, The. Although there were numerous predictions and suggestions of steam-propelled carriages, notably those of Sir Isaac Newton in 1680 and of others, the first locomotive that deserves the name was that of Richard Trevithick in 1803. True, Cugnot made a steam-driven road wagon in 1769 and Murdoch in 1784, but Trevithick was without doubt the father of the locomotive. He found that plain wheels had sufficient adhesion and that cogs were unnecessary; he used high pressure steam; he turned the exhaust into the stack and on discovering its effect on the fire, called it the "blast pipe." His first engine had four wheels, all drivers, 4 feet 6 inches in diameter. The boiler was 6 feet long and had a return flue, bringing the chimney or stack at the same end as the fire door. There was only one cylinder, but the length made up for two, as it was 8 inches in diameter by 54 inches long. Unfortunately circumstances prevented Trevithick from following up the development of the locomotive and as a consequence many of his ideas have been credited to others. Between Trevithick's engine and the Rocket (1829), which is sometimes called the first locomotive, men had not been idle by any means. Blenkinsop in 1812, Hedley with his Puffing Billy in 1813, Stephenson's Blucher in 1814, Oliver Evans in the same year and others make up the list.

In 1825 the first public railway was opened, the Stockton and Darlington Railway, and George Stephenson was engineer. Its first en-

gine was the Locomotive which was built by Stephenson in 1825. He also built the Hope, Black Diamond, Diligence and Experiment in 1826. Timothy Hackworth's Royal George, a rebuilt engine, went into service in 1827, but none were entirely satisfactory, and a prize of \$500 was offered in 1829 for the best engines. The Rocket, Novelty and Sanspareil entered and the Rocket won, although some claim this was due solely to the failure of the others, caused by poor work or material. This was the famous Rainhill trial which is so often quoted, and in which 29 miles per hour was made. The main dimensions of the Rocket were:

Cylinders, 8 x 16½.
One pair drivers, 3 ft. 8½ in.
Boiler, 3 ft. 4 in. diameter, by 6 ft. long.
Steam, 50 lbs.
Firebox, 3 by 2 ft.
Tubes, 23 three-inch.
Tubes H. S., 117.75.
Firebox, H. S., 20.
Total, H. S., 137.75.
Weight of engine, 4 tons 5 cwt.

This trial proved the success of the locomotive as a means of hauling loads, and this is probably the main reason that Stephenson has been given credit which belonged to others. In 1828 Horatio Allen went to England for the Delaware and Hudson Canal Co. and bought four locomotives, three from Foster, Rastrick & Co. and one from Stephenson. Stephenson's engine arrived first in January 1829 and was called the America. It had cylinders 9 by 24 inches, a boiler 49 inches in diameter by 9 feet 6 inches long with two fire tubes 19 inches in diameter. The four drivers were 48 inches in diameter, and the cylinders were at an angle of 33 degrees to the horizontal. This engine had a kind of "bar frame." Although the America arrived in the country first, it was not the first to run and for that reason the Stourbridge Lion, the first of the other three engines, is generally considered as the first engine in this country. This engine had cylinders 7½ by 36 inches. The boiler was 48 inches in diameter by 10 feet long. The reversing was accomplished by shifting eccentrics on the axle. From this date the United States began to take a hand in the development of the locomotive, and foremost at this time was the Baltimore & Ohio Railroad. On 4 Jan. 1831 they offered \$4,000 for the best American engine of 3½ tons to pull 15 tons on a level at a 15-mile speed. It must burn anthracite coal, be on four wheels and run on 400 foot radius curves, steam not to exceed 100 pounds. Phineas Davis won the prize with the York, a vertical engine with four 30 inch wheels. Ross Winans was connected with the road as engineer and this experience doubtless aided the work he did in after years as a locomotive builder of no small fame. The "Bury" boiler came into existence in 1832 in the engine Caledonian for the Liverpool and Manchester Railway. In the same year, the Ironsides, Matthew Baldwin's first engine, was put into service in this country. This was the beginning of the Baldwin Locomotive Works, the largest in the world.

The first steam whistle on record came into existence about this time, 1833, and was placed on the engine Samson, one of Stephenson's make. It is credited to a Mr. Bagster of the Leicester and Swannington Railway, on whose lines it was used.

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Large wheels began to be the fad and 7, 8 and even 9 foot drivers were built. The Liverpool was one of the famous Crampton engines with the drivers behind the firebox. The Cornwall was built by F. Trevithick in 1847 and had drivers 8 feet 6 inches in diameter. As originally built, this had the driving axle *above the boiler*. This was afterward changed and the engine was running the 45 minutes express between Manchester and Liverpool as late as 1897,—a remarkable length of service for a locomotive. This attained a speed of 79 miles an hour as early as 1851, while speeds of 75 miles were frequently reported. In 1853 the locomotive superintendent of the Bristol and Exeter Railway built a class of tank engines with 9 foot drivers, which seem to have capped the climax for large driving wheels. A speed of 81 miles an hour has been claimed for these engines and it is said the average consumption of coke was only $21\frac{3}{4}$ pounds per mile. The first locomotive in England to have a Giffard injector was Ramsbottom's Problem, which was built in November 1859.

Tractive Power.—Tractive power is another name for drawbar pull and shows the amount of horizontal effort exerted by a locomotive. It depends on the steam pressure, size of cylinders and diameter of drivers. The original formula or rule takes into account the area of both cylinders, circumference of wheel etc.; but this has been boiled down by cancellation to the following: Tractive power equals the square of cylinder diameter, times stroke in inches, times mean effective pressure per square inch, divided by the diameter of the driving wheel in inches. Put in the shape of a formula this is:

$$\text{Tractive power in pounds} = \frac{d^2 \times S \times P}{D}, \text{ where}$$

d = diameter of cylinder,
 S = length of stroke in inches,
 P = mean effective pressure.
 D = diameter of driving wheel.

For tractive power calculations, the mean effective pressure is generally taken as 85 per cent of the boiler pressure.

Taking the case of an 18 by 24 inch engine, 68 inch drivers, 200 pounds of steam, and we have

$$\frac{18^2 \times 24 \times 170}{68} \text{ or}$$

$$\frac{324 \times 24 \times 170}{68} = 19,440 \text{ pounds,}$$

drawbar pull, not allowing for internal friction of engine.

An easy way of reckoning is to remember that the cylinder diameter squared, equals the tractive power for one inch stroke, one pound pressure and one inch driver. Thus in the case above, if the stroke had been one inch, pressure one pound and driver one inch, the tractive power would have been 324 pounds. The actual pressure and stroke are multiplied by this and of course divided by the diameter of drivers, also in inches. From this can be readily seen how the diameter affects the tractive power and why freight engines have small drivers. If one engine has 84 inch drivers and another only 42 inches, other dimensions being the same, the latter will pull twice as much at drawbar, which means that it will start a train of double the size as the first. These calculations do not allow for internal friction.

Driving Wheels.—The number of driving wheels depends on the work to be done. A fast passenger train with few stops is often handled by an engine having but one pair of drivers in Europe and in a few instances in the United States. While the engine may slip slightly on starting, the number of starts are few and there is no friction from side rods, as in coupled engines. Every pair of wheels coupled together means added friction of the side rods, but it also means a reduction of the chance of slipping at the start. A little thought will show that the main pair of drivers are the only ones really driving the engine, unless this pair tends or starts to slip. When this occurs the others take up their share of the work. As this only occurs at the start or on a heavy grade, the extra drivers are apt to be carrying wheels only, the greater part of the time, although the heavy trains now being hauled in freight service give nearly a maximum load to the engine. For an all around engine, the American or eight wheel engine still has the lead, although most modern freight engines have six and eight drivers, while some roads are using 10 wheel passenger locomotives; the great majority, however, are still eight wheelers. The question of weight on drivers is somewhat a disputed point, the generally accepted proportion being four times the maximum drawbar pull, that is, if the tractive power is 25,000 pounds, the weight on drivers should be at least 100,000 pounds. This is because it has been found that this ratio will hold an engine from slipping on a good dry rail. For poor or slipping rails sand is used unless the weight is sufficient, say six times the tractive power.

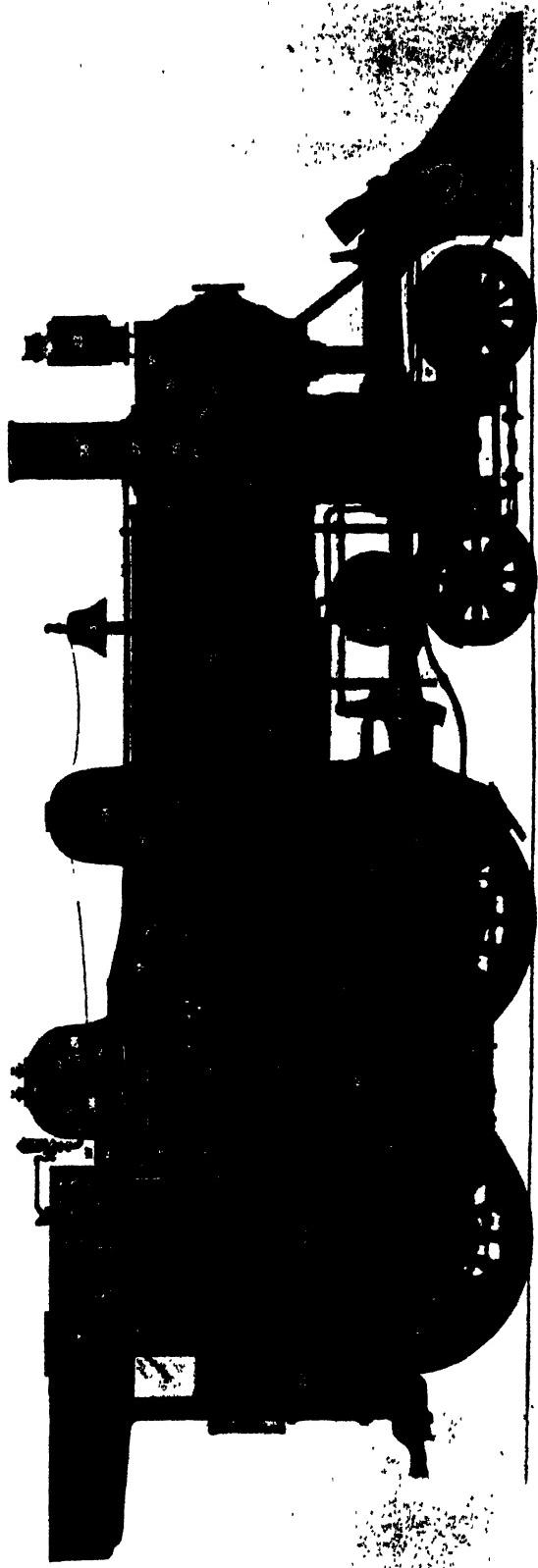
Although the number of driving wheels generally depends on the adhesion required, there are cases where light rails or poor roadbed prevent the necessary weight being put on the drivers needed for the work. In such cases more drivers are needed, more as carrying wheels than as drivers. In such cases, however, trailing or carrying wheels are used under the firebox. This is done on the Atlantic type of engine as well as on all single driver engines. The question of trucks under the front end seem to have been settled something as follows: Passenger engines on account of high speed, have a full truck to aid in rounding curves at speed. Freight or slow moving engines have a pony or half truck as in the mogul and consolidation engines. This gives the desired guiding of front end of engines and at the same time leaves nearly all the weight on drivers where it can do good work. In European countries freight or "goods" engines rarely have any trucks, all the weight being on the drivers, where it is effective for adhesion. This is possible on account of the roads being comparatively straight, but they would not do on our sharp curves on account of liability to derailment and wear of track.

Locomotive Types.—Classification was formerly accomplished by name only and as these varied somewhat in different parts of the country, the system caused some confusion. F. M. Whyte of the New York Central & Hudson River Railroad has devised a classification by numbers which is very simple, and which is being generally adopted. It consists of three parts to designate leading trucks, drivers and trailing trucks, each wheel counting one, thus 0-4-0

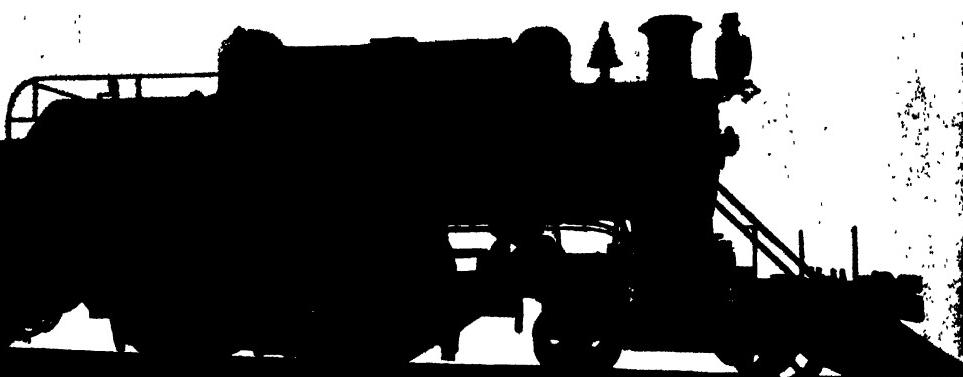
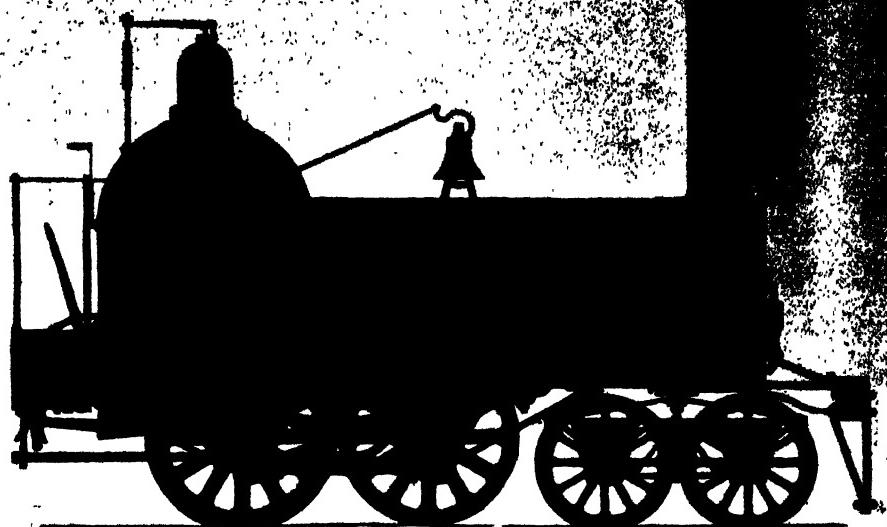
NAMES OF 240 PARTS OF A MODERN LOCOMOTIVE.

1. Pilot.	50. Valve Stem Packing.	93. Air Pump Connection.	144. Air Drum.	193. Driver Spring, Hanger Brake.
2. Draw Bar Plate.	51. Valve Stem Con-tac-tor.	94. Pump Connection.	145. Lower Rail of Frame	194. Throttle Pipe.
3. Coupler.	52. Valve Seat.	95. Train Pipe Connection from	146. Pedestal Pipe.	195. Throttle Valve.
4. Air Signal Hose.	53. Bridges.	96. V. & S. Reservoir	147. Driving Box Shoe.	196. Throttle Bell Crank.
5. Air Brake Hose.	54. Front Truck Joint Cock.	97. V. & S. Stem Rod	148. Driving Box Wedge.	197. Throttle Stem.
6. Hose Hangers.	55. Steam Perts.	98. V. & S. Link.	149. Wedges, Bolt	198. Dome.
7. Buffer Beam.	56. Cylinder.	99. Link.	150. Driving Box.	199. Dome Cap.
8. Pilot Bracket.	58. Back Cylinder Head.	100. Link's Stud.	151. Driving Axle.	200. Dome Casting.
9. Flagstaff.	59. Piston Packing.	101. Link Block Tr.	152. Side of Parallel Rod.	201. Safety Valves.
10. Arch Brace.	60. Piston Rod.	102. Link.	153. Rod Bush.	202. Chime Whistles.
11. Front Frame.	61. Piston Head.	103. Link Block.	154. Main Rod Connection.	203. Whistle Rig.
12. Cylinder Chute.	62. Piston Packing Rings.	104. Eccentric Connection, Rec'd.	155. Main Frame.	204. Ventilator.
13. Cylinder Cover.	63. Front Cylinder Casting.	105. Frame Brace.	156. Cab.	205. Vent.
14. Extension Front.	64. Front Cylinder Head.	106. Frame Splice.	157. Air Pump Lubricator	206. Air Gauge.
15. Headlight Step.	65. Cylinder Head Casting.	107. G-Ahead Eccentric.	158. G-Ahead Eccentric.	207. Air Gauge.
16. Signal Lamp.	66. Cylinder Laking.	108. Link IP Eccentric.	159. G-Ahead Eccentric Rod.	208. Steam Turret.
17. Number Plate.	67. Cylinder Lasing.	109. Link Long Shaft Arm.	160. G-Ahead Eccentric.	209. Injecto Throttle.
18. Smoke Arch Door.	68. Cylinder Cocks.	110. Linkings Shaft.	161. G-Ahead Eccentric Strap.	210. Blower Cock.
19. Smoke Arch Front.	69. Cylinder Cover.	111. Turnip Rod, Side Lever.	162. Back Link Eccentric Rod.	211. Blower Lamp.
20. Smoke Arch Ring.	70. Engine Trucks.	112. Counter Balance Rod.	163. Back Up Eccentric Strap.	212. Gauge Lamp.
21. Headlight Bracket.	71. Engine Truck Wheel.	113. Create Shifting Rod.	164. Create Shifting Rod.	213. Signal Whistle.
22. Headlight Case.	72. Engine Truck Tire.	114. Rocking Gates.	165. Expansion Pad.	214. Air Pump Throttle.
23. Headlight Reflector.	73. Engine Truck Axle.	115. Rocker Box.	166. Expansion Link.	215. Throttle Lever.
24. Headlight Burner.	74. Engine Truck Brass.	116. Reach Rod.	167. Running Board.	216. Sand Lever.
25. Cleaning Door.	75. Engine Truck Box.	117. Reach Pipe.	168. Air Cylinder.	217. Reverse Lever.
26. Necting.	76. Engine Truck Metal.	118. Cheek Valve.	169. Air Cylinder Brake Pump.	218. Engineer's Brake Valve.
27. Defector Plate.	77. Engine Truck Frame.	119. Check Valve.	170. Steam Cylinder Brake Pump.	219. Gauge Cocks.
28. Defector Plate Adjuster.	78. Engine Truck Pedestal Pipe.	120. Pipe.	171. Air Strainer.	220. Quadrant.
29. Air Pump Exhaust Pipe.	79. Engine Truck Tire.	121. Pipe.	172. Deliver to Drum.	221. Our Oil Valve.
30. Flower.	80. Engine Truck Tire.	122. Pipe.	173. Drift Cock.	222. Fire Door.
31. Smoke Stack.	81. Engine Truck Spud.	123. Pump Piston Packing.	174. Pump.	223. Cylinder Cock Lever.
32. Nozzle Stand.	82. Engine Truck Spring.	124. Pump Seal Connection.	175. Pump Seal Connection.	224. Pump Seal Connection.
33. Steam Pipe. (a.)	83. Engine Truck Spring.	125. Pump Seal Connection.	176. Pump Seal Connection.	225. Oil Can Shelf.
34. Te or Nigget Head.	84. Front Spring.	126. Pump Seal Connection.	177. Pump Seal Connection.	226. Hand Hold.
35. Dry Pipe Joint.	85. Front Spring.	127. Pump Seal Connection.	178. Pump Seal Connection.	227. Shake Lever Stab.
36. Petcock or Draft Pipe.	86. Front Spring.	128. Pump Seal Connection.	179. Pump Seal Connection.	228. Ash Pan Pumper Handle.
37. Strick Base.	87. Front Spring.	129. Pump Seal Connection.	180. Injector Overflow.	229. Whistle Signal Valve.
38. Smoke Stack.	88. Front Spring.	130. Pump Seal Connection.	181. Steam Pipe.	230. Brake Valve Reservoir.
39. Air Hand Rail.	89. Front Spring.	131. Pump Seal Connection.	182. Steam Pipe.	231. Train Pipe.
40. Oil Pipe Plug.	90. Front Spring.	132. Pump Seal Connection.	183. Steam Valve.	232. Train Pipe.
41. Cylinder Slide Plug.	91. Guide Yoke.	133. Pump Seal Connection.	184. Pump.	233. Signal Pipe.
42. Front Spring.	92. Guide Block.	134. Pump Seal Connection.	185. Water Valve.	234. Signal Pipe.
43. Main Rod.	93. Main Rod Fret.	135. Pump Seal Connection.	186. Fuel Pipe.	235. Feed Pipe Hanger.
44. Steam Chest Cover.	94. Main Rod Fret, Set at	136. Pump Seal Connection.	187. Fuel Pipe.	236. Feed Pipe.
45. Relief Valve.	95. Key.	137. Pump Seal Connection.	188. Fuel Pipe.	237. Tail Piece of Frame.
46. Balance Plate.	96. Crosshead Pin.	138. Pump Seal Connection.	189. Fuel Pipe.	238. Cab Bracket.
47. Balanced Slide Valve.	97. Crescent.	139. Pump Seal Connection.	190. Fuel Pipe.	239. Counter Balance Weight.
48. Valve Valve.	98. Front Trunnion.	140. Pump Seal Connection.	191. Fuel Pipe.	240. Stead Pipe.
49. Valve Stem.	99. Air Pump Valve.	141. Pump Seal Connection.	192. Fuel Pipe.	

SECTIONAL VIEW OF MODERN LOCOMOTIVE.



LOCOMOTIVES.



1. Gowan and Marx Locomotive, 1839.
2. Modern High-speed "Bicycle" Locomotive.

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indicates no front wheels, 4 drivers and no trailing wheels, a plain 4 wheel switcher. Some leave out the hyphens between the numbers but it is sometimes likely to be confusing, as with the decapod which becomes 2100 without the hyphens or 2-10-0 with them. The following table makes it plain:

Whyte's Locomotive Classification Adopted by American Locomotive Company.		
040	4	0 0 4 WHEEL SWITCHER
060	4	0 0 0 6 - -
080	4	0 0 0 0 8 - -
240	4	0 0 0 4 COUPLED
260	4	0 0 0 0 0 MOGUL
280	4	0 0 0 0 0 0 CONSOLIDATION
2100	4	0 0 0 0 0 0 0 DECAPOD
440	4	0 0 0 0 8 WHEEL
460	4	0 0 0 0 0 0 10 WHEEL
480	4	0 0 0 0 0 0 0 12 -
042	4	0 0 0 4 COUPLED & TRAILING
062	4	0 0 0 0 6 - -
082	4	0 0 0 0 0 8 - -
044	4	0 0 0 0 FORNEY 4 COUPLED
064	4	0 0 0 0 0 " 8 -
046	4	0 0 0 0 0 FORNEY 4 COUPLED
066	4	0 0 0 0 0 0 FORNEY 6 COUPLED
242	4	0 0 0 0 COLUMBIA
262	4	0 0 0 0 0 PRAIRIE
282	4	0 0 0 0 0 0 8 COUPLED DOUBLE ENDER
244	4	0 0 0 0 0 4 - -
264	4	0 0 0 0 0 0 6 - -
284	4	0 0 0 0 0 0 0 8 - -
246	4	0 0 0 0 0 0 4 - -
266	4	0 0 0 0 0 0 0 6 - -
420	4	0 0 0 0 BICYCLE OR SINGLE
442	4	0 0 0 0 0 ATLANTIC
462	4	0 0 0 0 0 0 PACIFIC
444	4	0 0 0 0 0 0 4 COUPLED DOUBLE ENDER
464	4	0 0 0 0 0 0 0 6 - -
446	4	0 0 0 0 0 0 0 4 - -
466	4	0 0 0 0 0 0 0 0 6 - -

Bibliography.—Cradock, 'Chemistry of the Steam Engine'; Clark, 'Railway Machinery'; Farney, 'Catechism of the Locomotive'; Halsey, 'Locomotive Link Motion'; Hughes, 'Construction of a Locomotive'; Meyer, 'Locomotive Construction' (1885); Norris, 'Handbook of the Locomotive' (1852); Sinclair, 'Engine Running and Management.'

FRED H. COLVIN, M. E.,

Author, 'American Compound Locomotives.'
Locomotive Engine, The. In the course of three quarters of a century, a vast wilderness on the American continent has been changed from gloomy untrdden forests, dismal swamps and pathless prairies into the abode of a high civilization. Prosperous states teeming with populous towns, fertile farms, blooming gardens and comfortable homes have arisen from regions where savage men and wild animals united to maintain sterile desolation. The most potent factor in this beneficent change has been the operation of railroads by the locomotive engine.

Importance of Easy Means of Intercommuni-

cation.—Easy means of intercommunication have been properly encouraged by all nations and races that ever have made material progress in the arts of civilization. Lord Bacon says: "There are three things that make a nation great and prosperous—a fertile soil, busy workshops and easy conveyance of men and animals from place to place." That opinion was founded upon an intimate knowledge of the world's history; knowledge of the forces, the institutions and the conveniences that contributed to make nations great.

When the idea of applying the potential power of heat through steam to lighten the drudgery of mankind was little more than a philosopher's dream, when a practical steam engine was only a hope, its most useful field was by most far-seeing men considered to be in carrying heavy burdens and in bringing distant places into closer communication. The need of improved methods of transportation, which so long oppressed the human race, did not, however, produce the steam engine. Grim necessity brought it forth when great properties were falling into ruin, because sufficient animal power could not be concentrated to perform stupendous efforts in limited space. The steam engine was invented when horses could not do the work of pumping water out of valuable mines 500 feet deep. It was a foregone conclusion that the steam engine would be applied to locomotive purposes as soon as increasing business rendered animals unequal to the task of supplying necessary motive power on roads and on water ways. See RAILWAY TRANSPORTATION.

Slow Evolution of the Steam Engine.—After a practical steam engine was put to work on the simple operation of driving a pump, it took half a century of invention to develop it into a motor suitable for driving manufacturing machinery; another half century passed before inventors seriously began the attempt of building a steam engine that could be used to propel a vehicle on land. Far-seeing, progressive men who kept themselves informed on leading inventive achievements were convinced long before steam was applied to land transportation that peripatetic steam engines would be forthcoming when sufficiently urgent necessity would arrive.

When the 19th century opened, Great Britain, more than any other country, needed the use of the steam engine for help in land transportation. Tedious delay occurred before the mill driving engine was applied to vehicles, the principal obstacle being the weight of the ponderous slow moving condensing steam engine which James Watt (q.v.) developed and made popular. A new type was required which in due time was invented by Oliver Evans (q.v.), an American, and utilized by various British engineers. Evans had struggled to interest his own countrymen in his high pressure steam engine but they failed to recognize its merit and refused to aid the inventor. He sent drawings to Europe, hoping that he would be more fortunate with European capitalists. His designs fell into hands that returned no recompense or acknowledgment, but they were used to guide others in building engines that were used for land propulsion.

First Attempts to Produce a Steam Locomotive.—Early in the eighteenth century a variety

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of attempts were made in England to produce a steam locomotive. Richard Trevithick (q.v.), a Cornish mining engineer, built several steam carriages for common roads and one engine to run on rails, but they were all failures although they possessed the elements that would have produced a successful locomotive in the hands of a persistent inventor. The first man to build a locomotive to run on rails and haul cars regularly was William Hedley, chief engineer of Wylam colliery on the River Tyne, near Newcastle, England. His first engine was not a success but his experience with its shortcomings enabled Hedley to build a second locomotive which worked fairly well, and is now to be seen in the South Kensington Museum, London, bearing the name of "Puffing Billy."

This engine (figure 1), which was built in 1813, had a return flue boiler, had upright cylinders and was a sort of grasshopper type of locomotive, which under a variety of modifications

gine, the front pair being the drivers, to which power was transmitted from two outside cylinders placed diagonally across the boiler pointing backwards. The first improvement made was to drop the cylinders to nearly a horizontal position which was followed by the cylinder being placed in the smoke box transmitting the power through a cranked driving axle. Most of the locomotive builders in Great Britain readily recognized the merits of the simple form of engine introduced by the Stephensons and the proceeded to develop the motor on similar lines.

Stephenson's Rocket.—There was no original feature about the Rocket, all the elements having been previously employed by other engineers, but the combination was the work of a master mind and gave to George Stephenson (q.v.) the reputation of being the inventor of the locomotive which is more than his due. When the locomotive is closely analyzed, we find that no proof exists of George Stephenson having

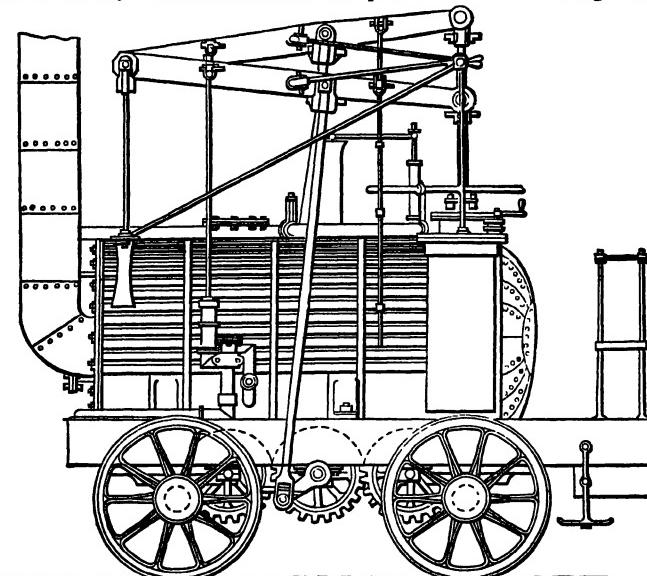


FIG. 1.

became the fashion and held the field up to 1829, when the directors of the Liverpool and Manchester Railway offered a prize for a locomotive that would fulfill certain practical requirements. A variety of locomotives were entered for competition and the prize was awarded to the "Rocket," made by George Stephenson & Son. This engine gave a new type of locomotive to the world which by mere increase of size is the locomotive of the 20th century.

Essential Elements of a Locomotive.—The elements combined to make a locomotive engine successful are a boiler that will generate steam rapidly and simple mechanism that will transmit the power directly to the driving wheels. The Rocket had a multitubular boiler, combustion being stimulated by exhaust steam passing through the smoke stack; and the cylinders transmitted the power to the driving wheels without the intervention of any useless beams or rods and the mechanism could be easily handled by one man.

The Rocket (figure 2) was a four wheel en-

gine, the front pair being the drivers, to which power was transmitted from two outside cylinders placed diagonally across the boiler pointing backwards. The first improvement made was to drop the cylinders to nearly a horizontal position which was followed by the cylinder being placed in the smoke box transmitting the power through a cranked driving axle. Most of the locomotive builders in Great Britain readily recognized the merits of the simple form of engine introduced by the Stephensons and the proceeded to develop the motor on similar lines. invented anything which became a permanent attachment. The tubular boiler had been applied to a boiler by Marc Seguin, a French railway master mechanic, several years before the Rocket was built, they were used in the United States in marine boilers before Stephenson's time, and the steam jet in the chimney had been used by Trevithick, Hedley, and others. But if Stephenson was deficient in inventive attributes he had the faculty of knowing a good thing when he saw it. He was one of the first men in Great Britain to realize that there was a great future for the steam engine as motive power for land transportation and he persisted in promoting the interests of the locomotive when it had few influential friends. Stephenson was a good representative of the best type of Englishmen. Opinionated and ever pushing his opinions with bulldog tenacity, he made weaker minds yield before his views on railways and locomotives. This was his hobby and he rode it so furiously that the British world was drawn along often against its will. By his dominant will, persist-

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ent determination and forcible arguments, he prevailed on British capitalists to construct an expensive railway for general transportation and induced them to try locomotives when all the scientific world insisted that locomotives were impracticable. He gave his country the glory of originating steam operated railways at the moment when America was almost ready to grasp the prize of honor.

Within a year after the Liverpool and Manchester Railway was opened, a host of other railway enterprises were in progress. The first locomotive almost universally used at that time was carried on four wheels, one pair of small carrying wheels close to the smoke box and one pair of driving wheels in front of the fire box. The boiler was about nine feet long and included an internal fire box about three feet long. The furnace in the Hedley and other early locomotives was located in the internal flue, which in some cases provided the whole of the heating surface; in other cases an addition of a return flue was made. When the Rocket was designed it was determined to employ small tubes to convey the heat of combustion to the water in

wheels in front, a pair of large driving wheels in the middle and a pair of carrying wheels behind. It made a conveniently simple arrangement for light trains. When the single pair of driving wheels were found insufficient to provide the necessary adhesion, coupled driving wheels were introduced. For freight service European locomotive designers at an early day introduced the use of three pairs of wheels coupled with-

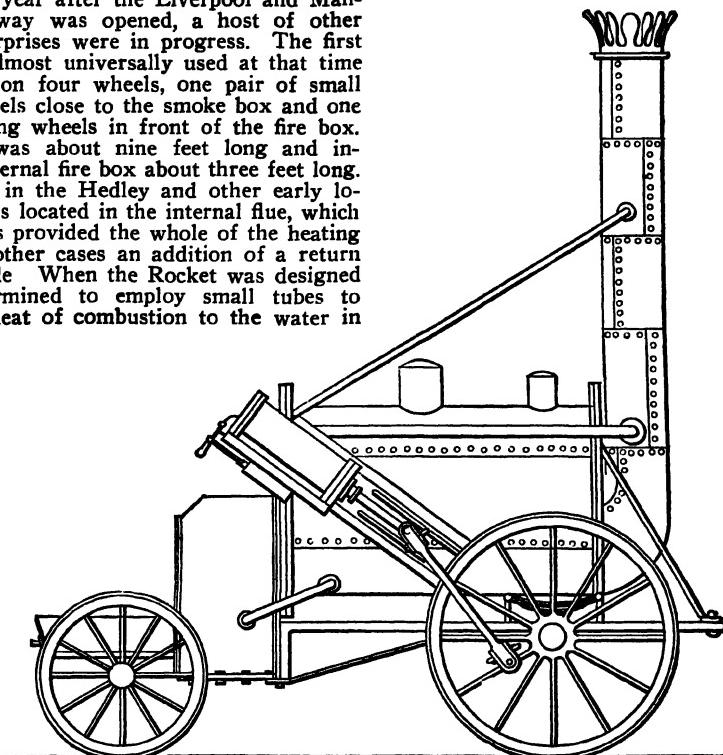


FIG. 2.

the boiler, a change which involved the use of a fire box as a furnace. That was made of rectangular section with flat walls which had to be strongly stayed to the outside shell, a water space being provided between the two surfaces. A smoke box with length about one quarter the diameter of the boiler was provided for the passage of the fire gases on their passage to the chimney. In the smoke box was located the opening of the steam exhaust pipe pointing straight through the center of the chimney and acting as a draft inducer. This combination of a multitubular boiler, a fire box surrounded by water and an exhaust steam jet located in the smoke box form the combined elements which make a high speed locomotive a possibility. They were first used together in the Rocket.

Development of the Locomotive in Europe.—The line of development exerted upon the locomotive was increasing the number of wheels and the proportions of boiler cylinders and running gear. In Europe the engine was at an early day provided with a pair of carrying wheels under the foot plate. The wheel arrangement then was one pair of small carrying

out any carrying wheels. That remained almost the universal practice until about 1900 when four pairs of driving wheels coupled began to find favor. On railways on the continent of Europe, British practice was closely imitated for years but in some cases very heavy multi-coupled wheel locomotives were used for freight service. In the British Isles inside cylinders were preferred with a plain slide valve operated by a link motion; on the Continent outside cylinders found most favor and articulated valve motion is more in favor than the link motion.

Genesis of Railroads in America.—The movement in favor of building railroads began in the United States about the same time as it began to influence public opinion in Great Britain. The 19th century had not advanced many years when people in the United States commenced to realize the urgent necessity for good arteries of intercommunication as a means of developing the extensive unsettled territory of the country. Statesmen were aware that the immense regions comprising the Roman Empire had been tied to the central government by a system of magnificent roads. There are numerous long reach-

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ing navigable rivers and there are a great many inland lakes on the American continent, but geographically they are far apart and there is no means of reaching vast regions except by land transportation. A series of Appian Ways was the solution of land travel advocated by political leaders. To the ordinary thinker a system of macadam roads would have solved the difficulty; but such roads were not made to any great extent, for the cost of making them was beyond the means of a thinly populated country where material for road making was frequently very scarce. An agitation in favor of providing a system of canal for inland transportation led to the construction of a great many artificial water ways (see CANALS), but they proved to be a great disappointment. The world of the infant republic could not hold its pace to the speed of the slow moving canal boat, which was prostrated by frost a large part of the time. Some better means must be found to move the increasing volume of merchandise and grain and coal and ore to the centers of consumption. The pinch of necessity wonderfully quickens the inventive faculties. Long before a mile of railroad was built in the United States, the seers, the men of penetrating vision, were discussing

railroad construction was inaugurated in the United States. Crude forms of locomotives had been used in the north of England for about fifteen years but even the scientific world of Great Britain knew almost nothing about them. It is not then surprising that Americans as a rule knew very little about what foreigners had done when they began building railways and their first locomotives were purely of original design. Very little accurate information had reached America concerning what had been done abroad before our people proceeded earnestly with the building of railroads. Before the railroad era there was scarcely any means of circulating scientific information, and few Americans had any idea of how railroads and the motive power for operating the same ought to be built, but that was considered no obstacle; they proceeded vigorously to construct railroads, learning the business over many expensive mistakes. The nation has always been noted for self-reliance, and the pioneer railroad builders pushed along without hesitation, crossing the bridges of difficulty when they were reached. When a portion of the Baltimore and Ohio Railroad was ready for business in 1830, few people believed that locomotives could be built that could oper-

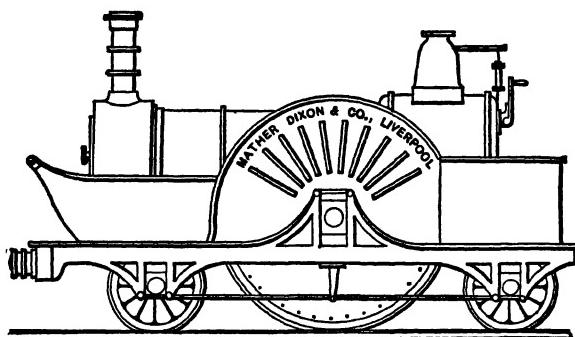


FIG. 3.

the possibilities of the steam engine as a means of accelerating land travel. The high pressure steam engine had been invented by Oliver Evans (q.v.), a native of Delaware, as an improvement of the Newcomen engine. Associated with the Evans engine were ideas of portability that were suppressed in the presence of Watts' ponderous slow-moving engines.

Colonel John Stevens (q.v.), a very influential American citizen, as early as 1812 advocated the use of railroads and in that year published a pamphlet on the superior advantage of Railways and Steam-carriage and Canal Navigation in which he outlined schemes of construction which were not greatly deviated from when actual railroad building commenced. The views of Colonel Stevens began gradually to have supporters and the sentiment in favor of railroad building spread slowly.

Baltimore and Ohio Railroad.—The first practical move of any importance was the building of the Baltimore and Ohio Railroad which was chartered in 1827 and partly opened in 1830. Other railroads were under construction at the same time and 1830 may be noted as the natal year of the American locomotive. Little was known anywhere about locomotives when

ate the road which was remarkably crooked. Popular belief was that hauling railroad cars would be a new line of enterprise for the mule that had supplied motive power to the canals. But Peter Cooper (q.v.), a merchant of Baltimore, considered that the use of steam was essential to make railroad operating a success and he had a small locomotive built to prove the faith that was in him. His engine, the "Tom Thumb," was little more than a model but it developed one and a half horse power and proved that a steam locomotive could be used in operating around very short curves.

Cooper's "Tom Thumb."—The Tom Thumb has an upright multitubular boiler but no claim for originality was advanced for it, as Nathan Read, of Warren, Mass., had patented such a boiler in 1791. The single cylinder was upright and transmitted power to the driving axle through a gear wheel. The engine performed the work for which it was built and for a time its form exercised considerable influence on the designing of American locomotives. Shortly after the experiments were made with Peter Cooper's model, the Baltimore and Ohio Railroad Company advertised, offering a premium of \$500 for a locomotive built in the United

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States which would meet certain specified conditions. The offer brought to the company five locomotives all built at different places, all of original design and all of them practical engines. That which was selected was built by Phineas Davis, of York, Pa. It had upright boiler and cylinders, after Cooper's idea, and was the first in America of a class of engines called "grasshoppers" that were a familiar feature on the Baltimore and Ohio Railroad for many years. The upright boiler and cylinders did not appeal to the mechanical men of other railroads. Most of them had engines built with a horizontal boiler resting on an oblong frame which carried the cylinders and secured the running gear. Even the small engines resting on four wheels were found to act injuriously upon the slender track of the pioneer railroads and the first important improvement effected by American engineers was putting the weight upon three pairs of wheels, two pairs forming the leading truck. This was done in 1832 by John B. Jervis (q.v.), chief engineer of the Mohawk & Hudson Railroad. That leading truck soon came to be a regular feature of American locomotives.

Jervis Invents the Four Wheel Truck.—

engine, which had a pony truck in front consisting of a single pair of wheels and three pairs of driving wheels connected. This gave the means of using a greater proportion of the weight for adhesion than was practicable with a ten wheel engine of the same weight.

Working Out Details.—For many years American railway master mechanics worked on making a locomotive as simple as possible, and the working parts were so proportioned and arranged that the repair expenses would be as low as possible. Various forms of running gear and foundation supports were tried; wooden frames, combined wood and iron frames, outside and inside frames made of iron plate or of iron bars. The fittest to survive were inside iron bar frames which for one decade before the 20th century began were gradually giving way to cast steel. The boiler material for many years was iron with, in some instances, copper fire boxes and brass tubes. The fuel used for the first 40 years of the railroad era was almost exclusively wood, but that became so dear in some quarters that the burning of coal had to be introduced. When that was successfully accomplished it was found that copper fire boxes and brass tubes wore rapidly from the attrition of the hard par-

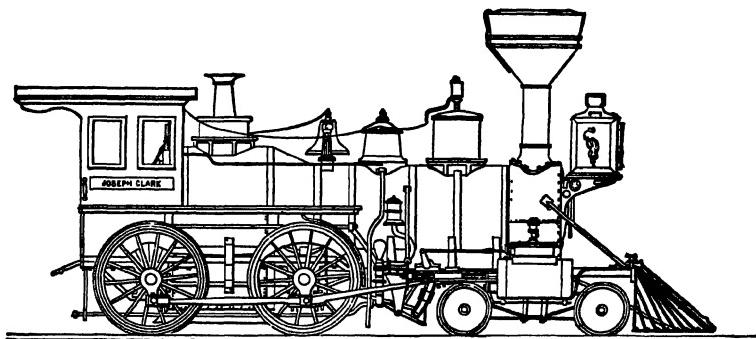


FIG. 4.

The course of evolution of the American locomotive turned upon methods of making the engines more powerful with due regard for the weakness of the rails the trains had to run upon. For about 20 years after the first locomotive was put to work in the United States, the design worked out by Jervis of a single pair of driving wheels and a four-wheel truck was the prevailing type. Then another pair of driving wheels was added, these being coupled to the main driving wheels, making what was long known as the American locomotive (figure 4). An important improvement effected upon this engine was placing equalizing beams between the driving wheels, which modified the shocks given by imperfect track.

The railroad companies having the haulage of coal, metals and other heavy freight began about 1850 to introduce locomotives of much greater power than the eight-wheel engine and those with six coupled wheels worked gradually into favor. Some companies used six-wheel connected engines without any carrying wheels; but the favorite heavy engine for many years was known as a ten wheeler, its arrangement being a four wheel truck and three pairs of driving wheels coupled. Then came the mogul

ticles of the coal. This led to the universal introduction of iron for fire boxes and tubes. The heat generated in a coal burning fire box is so intense that it was found to create blisters and flaws in the imperfectly welded iron. After much careful manipulation a mild form of steel was produced that proved a safe, strong and durable material for fire boxes. When this fact was satisfactorily demonstrated steel took the place of iron and it is still the only material used for locomotive fire boxes on the American continent. The successful use of steel fire boxes led to the same material being used for boiler shells. There again it proved itself superior to iron and all locomotive boilers are now made of mild steel.

The lines of progress then pursued by American railway mechanical engineers were: maintaining simplicity of parts while increasing the proportions for the purpose of making the locomotive sufficiently powerful to meet the requirements of fast and heavy trains. The fragile track over which the early locomotives were operated called for extraordinary care in reducing as far as possible the shocks resulting from the moving of the power-producing machinery, and of the running gear. Counterbalancing the driv-

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ing wheels and reciprocating parts of the engine received the greatest possible attention, and equalizing beams were introduced at an early day to distribute evenly among the wheels and springs the concussions caused by low joints and other defects of the track. Steel wheel tires that are almost immune from breakage gradually took the place of cast iron and wrought iron, which were originally employed exclusively for tire-making. Experience and theory both having demonstrated that high boiler pressure was necessary to produce economical use of fuel, a high quality of steel was produced for the construction of boilers and furnaces, with the most gratifying results. Steel boiler tubes have taken the place of copper, brass, or iron, and failures from this troublesome part of a locomotive boiler have been reduced to the lowest limits. Not a small part of the increased efficiency of boilers is due to highly perfected appliances provided for feeding the water. Injectors that can be regulated to supply exactly the volume of feed water required have pushed out of service the erratic and unreliable force pump, a change which protracts the life of the boiler by obviating extremes of temperature.

Although it was of the utmost importance for the safety of the public, and of every one connected with the operating of the locomotive, that the boiler pressure should be maintained below a certain tension, serious defects were long common in the construction of safety valves, with the result that boiler explosions were painfully common. In fact, one of the pioneer railway companies advertised that it kept a car loaded with cotton bales next to the engine to prevent passengers from being injured when the boiler exploded. That source of danger has gradually been eliminated, and modern safety valves may be depended upon to prevent the steam pressure rising more than two or three pounds per square inch above the blowing-off point.

The efficiency of the engine has been decidedly improved by setting the cylinders horizontally, thereby providing for direct transmission of power in line with the axles.

In the pioneer days of locomotive building, very little attention was bestowed upon the lubrication of valves and cylinders, an intermittent charge of tallow being considered sufficient, a practice which led to serious loss of power through excessive friction. The attention of inventors was directed to this defect of the locomotive, and a long line of patented lubricators were produced. The latest appliances for lubricating valves and pistons are now so efficient that a constant supply of lubricant is assured.

For many years after locomotives came into use great efforts were made and much expense incurred in giving the engines an ornate appearance. That fashion was gradually abandoned, and severe simplicity of form and modest coloring is more consonant with the character of the modern locomotive.

Sixty-Miles-an-Hour Engines.—When the locomotive had been in use in this country about 20 years, there arose an agitation for engines that would maintain a speed of about 60 miles an hour. Under this demand a number of locomotives were built with a single pair of driving wheels, but the movement toward high speed was short lived. Most of these high speed

engines resembled the English engine, figure 3. The designers of such engines appeared to think that the size of cylinders and driving wheels formed the measure of the speed capacity of a locomotive, but dearly bought experience taught them that the real controlling element is the size of boiler, which, in the engines referred to, was very small. For many years the growth of the locomotive was restricted by the comparatively fragile iron rail. The iron rail wore so rapidly and laminated so badly under heavy or sharp wheel impact, that prudent railroad managers generally restrained other officials in their zeal to increase the hauling power, and therefore the weight, of their locomotives. Until steel rails were introduced the subject of wear of rails was one of extraordinary solicitude to railroad managers.

Steel Rails.—In 1870 steel rails were beginning to be appreciated for their extraordinary wearing qualities. That time may be regarded as the beginning of the movement toward making the locomotive as powerful as it is possible to make a motor which has to run on a rail gauge of 56½ inches and pass under bridges and tunnels about 15 feet high. In 1870 the vast majority of locomotives in the United States were of the eight-wheel or American type, with cylinders 16 x 24 inches, driving wheels 60 inches in diameter, heating surface 900 square feet, grate area 12 square feet, total weight 50,000 pounds. Such an engine was used for all species of service, and was justly considered the best all-round locomotive that had even been employed. The wear-resisting steel rail has permitted locomotive builders to develop the eight-wheel engine until it has become common to carry 20,000 pounds on each driving-wheel, and as much as 25,000 pounds per wheel has been tried. That was beyond the limit of cool journal impact and led to the introduction of more driving-wheels, or a pair of carrying wheels under the foot plate in the highly popular locomotive known as the "Atlantic" or 4-4-2 type.

Increasing the Boiler Capacity.—The development of the boiler to supply steam to cylinders as large as 23 x 32 inches was the result of very skillful and ingenious labor performed by the most accomplished locomotive designers in the country. To produce a boiler of liberal steam-generating capacity it was necessary to increase the grate area. With the eight-wheel engine, which became the object of development, the fire-box was between the frames and the forward and back driving axles. Under these conditions the width could not be more than 34½ inches and the length 72 inches, so that little more than 17 square feet of grate area could be secured. When attempts were made to force these small fire-boxes to their utmost, it became a common practice to urge the fire with such intensity that from 100 to 200 pounds of coal per square foot of grate area would frequently be burned per hour. This was done with great waste of fuel and with destructive effects upon the fire-box. The necessity for an abnormally large grate to burn anthracite coal induced James Millholland, superintendent of motive power of the Philadelphia & Reading Railroad, in 1857, to place the grate above the frames, which gave a material increase of grate surface. Zerah Colburn, in 1854, designed some engines for a road which is now the Delaware, Lackawanna & Western Railroad, with fire-box 7

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feet 6 inches wide and 6 feet long, providing 45 square feet of grate area. These fire-boxes were entirely behind the driving wheels, and the engines were not adapted to anything except very slow service. Millholland modified the Colburn design in a boiler patented in 1862. This boiler had an overhung fire-box, a combustion chamber, and other features that enabled it to burn anthracite coal successfully. In 1877 John E. Wootten, general manager of the Philadelphia & Reading, patented a boiler with a fire-box extending over the driving wheels, which was practically the first of a type now largely used. The circumstances which influenced the designing of boilers with very large grate surface did not move the railroad men in charge of bituminous coal-burning engines until after the advent of steel rails. The rapid increase in the capacity of locomotives that followed the improvement in the track compelled the locomotive designers to devote attention to the increasing of the grate area. This induced them to adopt Millholland's plan of putting the grates above the frames, and to making them as long as possible consistent with the ability of a fireman to cover the front part with fuel. The limit of burning a moderate amount of coal per square foot of grate was again soon reached, because demands for more powerful locomotives continued, and the physical limit imposed by bridges and permanent structures still left some possibility of increasing the size of the engines. The next step to provide a fire-box with increased grate area was made by the Baldwin Locomotive Works in 1895 by the introduction of the "Atlantic" type, 4-4-2, designed by S. M. Vauclain. In that form the fire-box may be made as wide as a sleeping-car, which enables the designer to use a grate large enough for any locomotive that can be built to meet the restrictions of track and bridges, and may be regarded as final under existing conditions.

Introduction of Compound Locomotives.—American railroad managers have never been exacting in putting restrictions upon the amount of fuel used by locomotives, regularity of service and freedom from break-downs being considered of most importance. But so much had been said and written about the reduction of fuel expense that might result from the introduction of compound locomotives (see LOCOMOTIVES, COMPOUND), that various railroad companies began about 1890 to purchase engines of that character. In this year of grace 1904 there are probably 10,000 compound locomotives in use in North America. There are a variety of types, two-cylinder compounds with high pressure cylinder on one side and low pressure cylinder on the other. The four-cylinder Vauclain compound is more numerous than all the others combined. It has two cylinders on each side transmitting the power through a single cross-head. There are a few tandem compounds in use that have two cylinders in line on each side; and there are a few four-cylinder compounds with two of the cylinders outside on the frames and two cylinders below the smoke-box, the latter transmitting the power through cranked axles. This type of locomotive promises to become the most efficient type for heavy passenger train service. The compound locomotive has not achieved real popularity with railroad men, and, so far, the purpose of their introduction has not been fulfilled. They have not performed

the work of hauling trains at less expense than the simple engine.

About 20 per cent of the fuel placed upon the tenders of locomotives is used for other purposes than that of hauling trains. Part of that is used for raising steam, part for keeping the boiler hot when the engine is not working, and part is wasted through the safety valves and other sources of leakage. This leaves only 80 per cent of the fuel used as a basis for saving by compounding or other improved methods of using steam. The weight of evidence goes to show that the saving effected by compounding is about 8 per cent. If a compound locomotive is not capable of running as many miles per year as a simple engine, a charge of inefficiency will stand against it. Railroad managers complain that the compound loses mileage as compared with a simple engine, and that it is more expensive to keep in working order, so that the saving of fuel is generally overbalanced by other expenses.

Efficiency of Fuel.—An ordinary locomotive develops one horse-power for from 12 to 15 minutes per pound of coal burned in the fire-box equivalent to four or five pounds of coal per horse-power per hour. Engines worked under particularly favorable circumstances may double the duty per pound of coal consumed, while others again will not produce one horse-power short of six or seven pounds of coal per hour. Under favorable conditions a locomotive compares fairly well with a good stationary engine, under the unfavorable conditions of being forced so that the steam passes out of the cylinders at nearly steam-chest pressure, no measure of economy ought to be expected. Predictions are rife that the days of the steam locomotive are numbered, and that electric power generated cheaply in huge central stations will in the near future move the passenger and freight trains now drawn by toiling locomotives. This prophecy may be true, but when the last steam locomotive is consigned to the scrap heap or to the Smithsonian Institution, it will be well to credit it with having performed noble service to the human race.

Reduced Cost of Transportation.—As motive power for the transportation of freight and passengers, the locomotive has steadily increased in efficiency ever since Cooper's "Tom Thumb" wound around the sharp curves of the Maryland hills. At the time that feat was performed the cost of moving flour from Columbia to Philadelphia over a State-made turnpike was 13.51 cents per ton per mile. Transportation was so expensive in regions remote from water carriage as to be prohibitive except for articles of special value. In 1823 John Stevens, of Hoboken, obtained from the legislature of Pennsylvania a charter to build a railroad from Philadelphia to Columbia, in which he was authorized to charge 7 cents per ton per mile. In 1870 the charge for a bushel of wheat per rail from Chicago to New York was 26.11 cents. Under the influence of steel rails and heavy locomotives the rate per bushel of wheat from Chicago to New York had dropped in 1899 to 11.6 cents. An item in 'Railway and Locomotive Engineering' says that when the volume of freight was large enough James J. Hill had carried 10 barrels of flour 10 miles for 1 cent. A barrel of flour weighs 196 pounds, so Mr. Hill has carried 1,960 pounds 10 miles for 1

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cent, presumably at a profit. The steady decrease in freight rates will be understood by an examination of the annexed table. The distance from Chicago to New York is about 1,000 miles. The figures in the table apply to any territory for the whole or a part of the distance hauled.

RATES IN CENTS PER BUSHEL OF WHEAT AND CORN FROM CHICAGO TO NEW YORK.

YEAR	WHEAT		CORN	
	By rail Cents	By rail and water Cents	By rail Cents	By water Cents
1870	26 11	19.58	24.37	19 32
1880	19 8	15.8	17.48	14.43
1890	14 3	8 52	11 36	7 32
1900	10 8	.....	10 1	.....
1904	11 4	.....	10 6	.....

Influence of Steel Rails and Huge Locomotives.—The use of steel rails and huge locomotives has exerted tremendously far-reaching effects and has created social revolutions in certain parts of the world. They brought the cereals of regions west of the Missouri River and of the remote Northwest into competition with the grain-raising districts of the Eastern States and with those of Europe, Africa, and Asia. It threw many farms in New England and along the Atlantic seaboard out of cultivation, and it caused a semi-revolution in farming business in the British Isles, strongly affecting the condition and fortunes of millions of people. Irish peasants used to go in thousands to England and Scotland to work on the harvesting of the grain crops, thereby earning enough money to pay the rent of their small holdings. Steel rails and consolidation locomotives stopped the cultivation of so many grain fields in the British Isles that the help of the Irish worker was no longer needed. The suffering and discontent arising from the changed conditions led to the vigorous agitation for home rule in Ireland; and in the year 1904 an agitation exists for a duty on grain entering Great Britain, for the protection of British farmers.

While inflicting injury and suffering upon the few, progress as represented by Bessemer's great invention and by the enterprise of American railway master mechanics has exercised a beneficent influence upon the many, and the world at large has been a great gainer from the skill and the enterprise of the inventor of a marvelous system of steel-making, of the American mechanic, of the engineer, of the railroad constructor, and of the railroad manager. They have together built a monument to progress which will always be regarded by a grateful people as one of the highest achievements the world has ever witnessed. ANGUS SINCLAIR,
Editor 'Railway and Locomotive Engineering.'

Locomotive and Engine Industry. It is not difficult to trace the inception and progress of locomotive engineering in the United States. Although other lines of rails had previously been laid for special purposes, the Baltimore and Ohio and the South Carolina railroads — both begun in 1828 — were the first American railways constructed to carry passengers and freight. Upon the former was run the first American-built locomotive, that of Peter Cooper, constructed in 1829, a mere working model, not intended for permanent service, but to demonstrate the practicability of operating the line

by locomotive power. It did this successfully, and led to the completion of the road, which otherwise might have been abandoned. This little machine, with a single cylinder three and a half inches in diameter, a boiler no larger than that of an ordinary kitchen-range, and tubes improvised from gun barrels, on its trial run attained a speed of 18 miles an hour, and hauled 40 passengers besides the driver, who was Peter Cooper himself. The first locomotive for real service used in the United States was the Stourbridge Lion, built at Stourbridge, England, and imported by Horatio Allen, in 1829, for the Delaware & Hudson Canal Company. In 1830, the first locomotive constructed in the United States for actual work, the Best Friend, was built by the West Point Foundry, for the South Carolina Railroad. In 1831 Matthias W. Baldwin, a manufacturer of bookbinders' tools, of Philadelphia, was engaged by the proprietors of Peale's Museum, of Philadelphia, to construct a model locomotive to operate on a circular track, to satisfy the public curiosity growing out of the Rainhill contest, in England, which had resulted in a victory for Robert Stephenson's Rocket, and which was then attracting widespread attention. In September 1832, there were built at York, Pa., by Davis & Gartner, three locomotives of the "grasshopper" pattern, for the Baltimore and Ohio Railroad, from designs of Phineas Davis and Ross Winans. Some of these locomotives continued in service about 60 years, and were in use at Mount Clare, in Baltimore. The success of the Peale Museum model was such that Mr. Baldwin was employed by the Philadelphia, Germantown and Norristown Railroad Company, in 1831, to construct a locomotive for their line. This locomotive, Old Ironsides, was completed in November 1832. It was a four-wheel engine, similar to the English design of the day, and weighed in running order over five tons. The rear, or driving wheels, were 54 inches in diameter, placed on a crank axle. The cylinders were $9\frac{1}{2}$ inches in diameter, by 18 inches stroke, and were attached horizontally to the smoke-box; the frame was of wood; the wheels had heavy cast-iron hubs, wooden spokes and rims, and wrought-iron tires; there was no cab; and the tender was four-wheeled, with wooden sides and back for holding the wood used for fuel, and an iron box for water-tank. This locomotive attained a speed of 30 miles an hour, with its train attached, and upon a special occasion it is said to have attained a speed of 60 miles per hour. Locomotive engine building may be said to have become fairly established by 1834; but in those early days, when there was no practice to guide, skilled workmen were few, and few shop facilities existed, the difficulties surrounding the locomotive builder were extraordinary, and only the most indomitable perseverance attained success. The American pioneers of railway mechanics were Cooper, Allen, Baldwin, Rogers, Norris, Winans, Campbell, and their co-workers, and later William Mason, Cooke, McQueen, Millholland, and Hudson.

The early American locomotives were similar in all essential features to the English engines of the day, being constructed from published descriptions or from actual observation of them. The importation of English locomotives did not long continue, for the early American builders soon made radical departures from

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the English types. The steps by which these differences were reached were the substitution of a four-wheel swiveling truck or bogie for the pair of fixed carrying-wheels (1832); the use of the cross-head pump for supplying feed-water to the boiler (1833); the use of the half-crank driving-axle in place of the crank-axle (1834); the introduction of outside connections to the driving-wheels (1835); the coupling of two pairs of driving-wheels, patented by H. R. Campbell (1836); the use of counterbalance weights for the revolving and reciprocating parts (1837); of lap-welded wrought-iron boiler tubes (1838); of bar-frames of forged iron with forged pedestals (1840); of wooden cabs with glass windows, which originated about 1840 in New England, where protection for the engine-men was necessary on account of the severity of the winters; the introduction of Baldwin's flexible-beam truck (1842); the connection of equalizing beams with the driving-wheels, invented by Eastwick and Harrison (1845); the use of the "ten-wheel" locomotive, with six coupled wheels and a leading four-wheeled truck (1846); and the use of the Mogul locomotive with six coupled wheels and a leading two-wheel truck (1861), and of the Consolidation type, with eight coupled wheels and a leading two-wheel truck, designed by Alexander Mitchell of the Lehigh Valley Railroad, and built at the Baldwin Locomotive Works in 1866. Other features of the American locomotive appear to the foreigner to be peculiar, such as the pilot or "cowcatcher," the bell, the boiler covering of planished or Russia iron, the large headlight, and the directness and visibility of the pipes and other appurtenances. The aim of American locomotive designers has been to produce a machine having the maximum flexibility of wheel-base to enable it to pass sharp curvature and adapt itself to the unevenness of track subject to the action of severe frosts; and to provide for repairs by making every part accessible and removable without affecting other parts. Prior to the Centennial Exhibition of 1876, it was frequently customary to use gaudy painting and forms of unessential parts supposed to be ornamental; but during the period of business depression and retrenchment of 1876 the railroads learned to dispense with this source of expense. This cause, together with the improvement in the public taste which was coincident with, or the result of the Centennial, led to the abandonment of fancy painting and molded or beaded ornamentation, and the substitution of smooth, appropriate forms, painted in plain dark colors, with little or no striping. In the early 50's the "American" type, with four coupled wheels and four-wheeled truck, patented by Campbell in 1836, had become the most generally adopted class of locomotive, and was for many years thereafter used for general service—passenger, freight, and switching. The growing traffic of the railways, however, created the need for more powerful locomotives constructed especially for freight service, as well as for engines better adapted for switching than old road locomotives, so that, in the '60's, the Mogul and ten-wheel types were widely adopted, and between 1870 and 1880 the Consolidation type became the recognized standard for the heaviest freight service. Prior to 1880, the general use of iron tires and iron rails of light section, usually not exceeding 50 to 60

pounds per yard, limited the weight per axle to about 12 tons as a maximum; but about that year the general substitution of steel tires and the growing use of steel and the introduction of the heavier rails possible in steel, together with an awakening to the advantages of larger heating surfaces in locomotive boilers, led to the acceptance of greatly increased weights. This tendency has since grown constantly. The use of heavier, more powerful locomotives made practicable economies in transportation by the use of cars of larger carrying capacity, which in turn required still heavier locomotives to move them. The limit seems to have been reached with the present car loads of 50 tons, which are about as large as will serve the convenience of shippers. The heaviest locomotives of 1901 had as much as 30 tons' weight per axle.

Among the locomotive-building establishments which have contributed a share to the motive-power of the past, and have either disappeared altogether or have discontinued the manufacture of locomotives for other lines of business in which competition is less intense, may be mentioned the works of Norris Brothers, of Philadelphia, which in early days were active competitors of Baldwin and Rogers, but which, after many vicissitudes, went out of existence in 1865. These works in part are now included in the plant of the Baldwin Locomotive Works. Baltimore had the works of Ross Winans and the Denmeads. Boston has had the works of Seth Wilmarth, the Globe Works of John Souther, and the works of McKay & Aldus at East Boston, and the Hinckley Locomotive & Machine Works, one of the oldest, occupied an honorable position in the business until about 15 years ago. New England has been an active locomotive-building section; in addition to the works mentioned may be noted those of Ballard Vail, Andover, near Boston, Mass.; Corliss & Nightingale, Providence, Geo. H. Corliss, the great engine-builder, proving less successful in the manufacture of locomotives; A. Latham & Company, White River Junction; the Amoskeag Locomotive Works at Manchester, N. H.; the Locks and Canals Works at Lowell, Mass.; a works at Lawrence; and later the Taunton Locomotive Works, the Mason Machine Works, and the Portland Locomotive and Car Company, three concerns which later left the business. New Jersey also has been a prolific field of locomotive-manufacture: an offshoot from the Rogers Works was that of William Swinburne, of Paterson, subsequently called the New Jersey Locomotive Works, and finally the Grant Locomotive Works. Finding their shops antiquated and their appliances inadequate to modern requirements, the Grant Works ceased business at Paterson in 1885, and reorganized with new capital and new shops at Chicago. This plant succumbed to the financial storm of 1893, and was sold to the Siemens & Halske Electric Company, which for a time operated it under its own name for the manufacture of electrical equipment and locomotives, but this proved to be unprofitable, and the works are now abandoned. For many years Breese, Kneeland & Company operated the Jersey City Locomotive Works at Jersey City, and Van Cleave, McKean & Dripps had shops at Trenton. Eastwick & Harrison were builders of locomotives at Newcastle, Del., but, failing in 1840, were succeeded by the Newcastle

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Manufacturing Company, who subsequently gained fame and wealth in railway operations in Russia. In the West were the Cuyahoga Works of Cleveland, those of Scovill at Chicago, Booth & Company at San Francisco, and others at Detroit and Milwaukee. Later the Rome Locomotive Works, at Rome, N. Y., entered the field, but had only a few years of disastrous existence, which ended in 1891. The list might perhaps be extended further, but it is a more agreeable task to record the works which were in business in 1901 to 1903.

The Baldwin Locomotive Works of Philadelphia were established in 1831 by Matthias W. Baldwin, as has before been mentioned. The annual capacity is more than 1,200 locomotives. The works occupy 16 acres in the centre of the city. A number of the buildings of later construction are from four to six stories high and of the most substantial character. Employment is given to upward of 10,000 men. The total production of these works from their establishment to 1901 was nearly 20,000 locomotives.

The Rogers Locomotive Works, of Paterson, N. J., were founded in 1836 by the firm of Rogers, Ketchum & Grosvenor. The mechanical head and dominating spirit was Thomas Rogers. Upon his death in 1856 the business was incorporated under the title of The Rogers Locomotive and Machine Works, of which Jacob S. Rogers was president. Owing to J. S. Rogers' increasing age, the company was reorganized in 1892 under its present title of The Rogers Locomotive Company. These works give employment to about 1,400 men, and have an annual capacity of 250 locomotives.

The period of business prosperity which followed the war with Spain in 1898 was marked by the consolidation of the competing members of many industries into large corporations or so-called "trusts." This movement extended to the locomotive industry and the eight works next mentioned were in July 1901 purchased and united into one organization known as The American Locomotive Company. Its officers are S. R. Callaway, president; Albert J. Pitkin, first vice-president; R. J. Gross, second vice-president; Leigh Best, secretary, and James E. Sague, mechanical engineer. This company has a capital of \$50,000,000, half of which is common stock and half is cumulative, 7 per cent preferred stock. The works acquired by the company, with the approximate capacity of each, are as follows:

	Locomotives per annum
Schenectady Works, Schenectady, N. Y.....	450
Brooks Works, Dunkirk, N. Y.....	450
Pittsburg Works, Pittsburg, Pa.....	200
Rhode Island Works, Providence, R. I.....	150
Richmond Works, Richmond, Va.....	150
Cooke Works, Paterson, N. J.....	125
Manchester Works, Manchester, N. H.....	100
Dickson Works, Scranton, Pa.....	85
Approximate total capacity.....	1,710

Following is a brief sketch of the history of each of these works: The Schenectady Locomotive Works established by Norris Brothers in 1848, passed into the sole control of John Ellis in 1863, who was succeeded by his sons, John C. Ellis, Charles G. Ellis, Edward Ellis, and William D. Ellis, in succession.

The Cooke Locomotive and Machine Company of Paterson, N. J., began the manufac-

ture of locomotives in 1852. The works were established about 1800, and for 50 years were engaged in the manufacture of cotton and other machinery. The original shops in Paterson have recently been abandoned to other uses, and new and completely modern shops have been built.

The Pittsburg Locomotive Works, organized in August 1865, were completed so far as to construct their first locomotive in the latter part of 1866. The works were originally designed for a capacity of 30 locomotives a year, but by the construction of new fire-proof buildings, and the addition of new and improved machinery, the capacity has been gradually increased. The works occupy nearly 12 acres of ground, and their equipment includes the most improved hydraulic, pneumatic, and electric appliances for fashioning the work and handling materials. There is also a completely appointed laboratory for chemical and physical tests of materials.

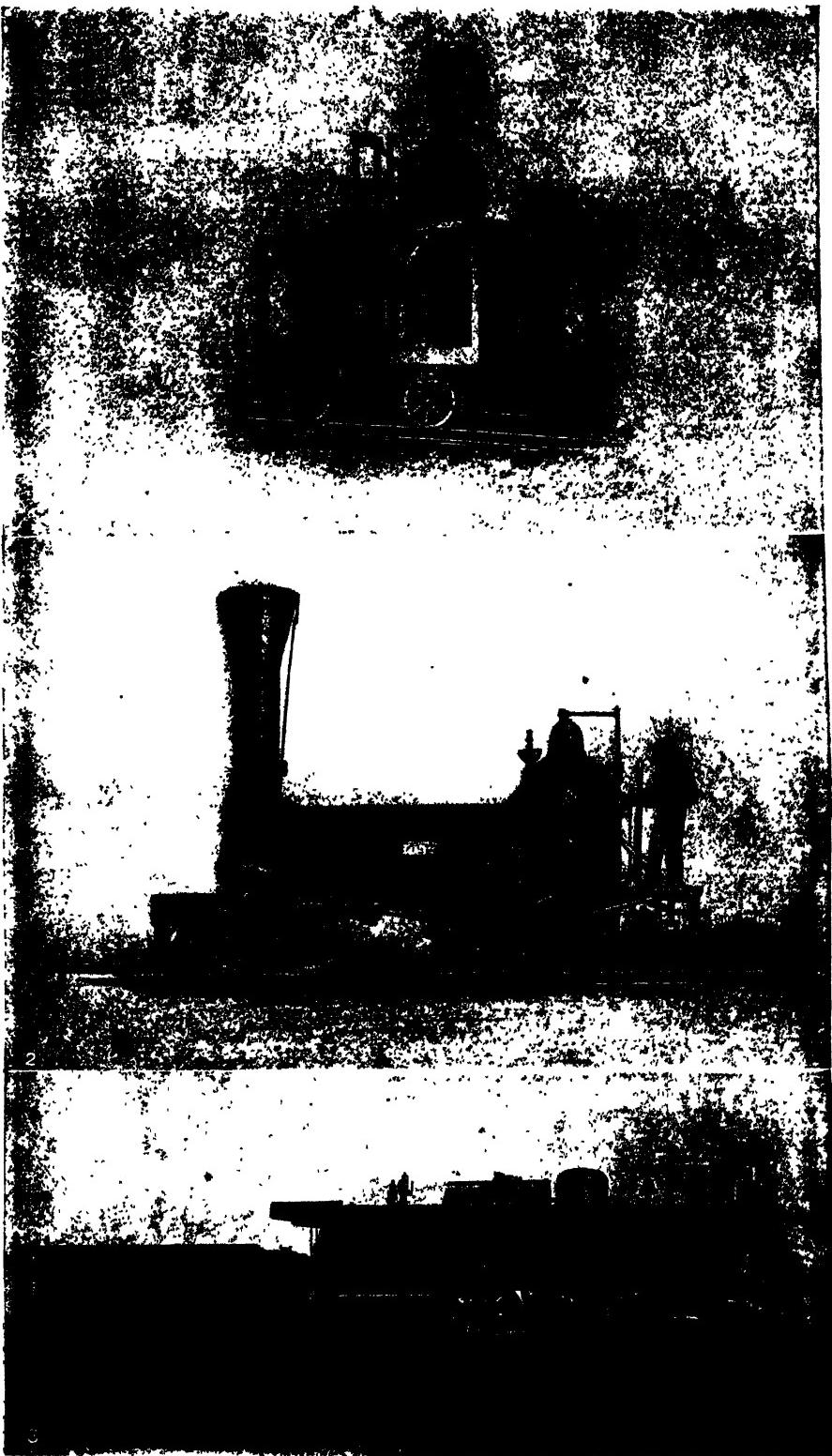
The Rhode Island Locomotive Works of Providence were likewise established in 1865. These works have occupied an important position in the field of locomotive manufacture.

The Brooks Locomotive Works of Dunkirk, N. Y., were originally constructed as the locomotive building and repair shops of the Erie Railway. In 1869, Jay Gould, then president of the Erie Railway, having completed extensive shops at a more central location on the line of that road, ordered the Dunkirk shops to be permanently closed, and the machinery removed to other locations. Horatio G. Brooks, at that time superintendent of motive power and machinery of the Erie Railway, whose home was at Dunkirk, and whose interests were identified with the welfare of that place, made a proposition to Mr. Gould for a lease of the shops and machinery for the purpose of establishing the business of locomotive-building. The lease was consummated in November 1869, and before the close of the year the first two locomotives of the new Brooks Locomotive Works Company were turned out. In 1883 the property, comprising 20 acres of land, the permanent plant, additions and machinery, was purchased from the New York, Lake Erie and Western Railroad Company by the Brooks Locomotive Works.

The Richmond Locomotive and Machine Company of Richmond, Va., is the only locomotive-manufacturing plant in the South. The works were established in 1865 for the manufacture of plantation and saw-mill machinery, and were gradually adapted for the construction of tram and street-car motors. In 1880, the shop having been destroyed by fire, it was removed beyond the city limits and reconstructed upon an enlarged scale. In 1889 it secured the contract from the United States government for building the machinery of the armored battleship Texas, which gave it wide prominence. This contract was successfully executed, but the works have since been devoted exclusively to the construction of locomotives.

The Dickson Manufacturing Company of Scranton, Pa., are important manufacturers of locomotives and of mining machinery, for which their location in the anthracite coal regions of Pennsylvania is most suitable. These works were established in 1862.

The Manchester Locomotive Works, of Manchester, N. H., were established in the early



1. American Locomotive of 1830.
2. American Locomotive of 1840.
3. American Locomotive of 1900.

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fifties, and were for many years under the management of Aretas Blood, who was prominent in locomotive-building in New England.

The works of H. K. Porter & Company of Pittsburgh were established in 1866, and have been devoted exclusively to the manufacture of light locomotives for special work in mills, furnaces, and mines, and for contractors' and plantation service, etc. The firm was at first Smith & Porter, and later Porter, Bell & Company.

From the foregoing it is apparent that, exclusive of such locomotives as are built in railroad shops or shops not regularly engaged in the business of locomotive-building, the locomotive-manufacturing establishments of the country have an aggregate capacity of about 3,500 locomotives a year. The demand for locomotives in each year is largely dependent upon two factors: the general prosperity of the country, which is always accompanied by a large volume of freight to be transported, bringing large earnings to the railroads; and the mileage of new lines under construction and requiring to be equipped. These two causes are really one, because many new lines are built only in times of general prosperity when capital has laid aside its usual timidity and money is seeking new channels of investment. Unfortunately business prosperity is intermittent, and during the less prosperous years the capacity of these several works to produce locomotives is largely in excess of the ability of the railroads to purchase them. The actual reported production of the past 12 years, with the number exported (not including Canada and Mexico), is as follows:

LOCOMOTIVES PRODUCED AND NUMBER EXPORTED.

YEAR	Total Production Reported	Number Exported Omitting Mexico and Canada	Remainder not Exported
1889.....	1,860	187	1,673
1890.....	2,213	137	2,076
1891.....	2,300	357	1,943
1892.....	1,764	141	1,623
1893.....	2,011	205	1,806
1894.....	695	189	506
1895.....	1,110	252	858
1896.....	1,175	261	914
1897.....	1,251	338	913
1898.....	1,875	468	1,407
1899.....	2,473	517	1,956
1900.....	3,153	525	2,628
Average.....	1,823	298	1,525

The total number of locomotives in use upon the railways of the United States, Canada, and Mexico for the same years, as reported to 'Poor's Manual,' is as follows: 1889, 30,566; 1890, 31,812; 1891, 33,563; 1892, 34,626; 1893, 36,018; 1894, 36,304; 1895, 36,610; 1896, 36,388; 1897, 36,410; 1898, 36,746; 1899, 37,245; 1900, 38,065.

As the average life of a locomotive is 20 years, an annual production of about 1,800 locomotives will supply the natural wear, while there is in the country a capacity for constructing in contract and railroad shops about twice that number. The difference between the number requiring replacement on account of natural wear and this total capacity must be absorbed

by locomotives for new lines, for permanently increased traffic, and for export. The locomotive-building establishments above mentioned employ in the aggregate 25,000 men, who receive in wages about \$15,000,000 annually. The total value of the product of these works, when operating to their full capacity, is more than \$45,000,000.

American locomotives soon attracted attention abroad. In 1845 the Baldwin Works exported locomotives to the Royal Württemberg Railroad. In 1848 Rogers shipped locomotives to Cuba; and while the exportation of locomotives during recent years has been largely to those countries without the resources requisite for locomotive-building, in the earlier years it was not uncommon for American manufacturers to ship their products to Austria, to England, and elsewhere in continental Europe. Statistics fail to show the number of locomotives exported during the earlier years, and even recent statistics are inaccurate in not covering shipments of locomotives to Canada and Mexico. During the 20 years between 1871 and 1900, there were exported 5,232 locomotives, having a valuation of \$48,797,527, to countries exclusive of those reached by rail connections from the United States. At the present time American locomotives are shipped to almost every country in the world. The extent of their exportation is shown by the following list of countries to which locomotives were shipped by the Baldwin Locomotive Works during the three years 1898, 1899, and 1900:

NORTH AND SOUTH AMERICA.

Alaska	Chile	Nicaragua
Barbados	Costa Rica	Newfoundland
Brazil	Cuba	Nova Scotia
British Columbia	Ecuador	Peru
Canada	Guatemala	Porto Rico
Colombia	Mexico	San Domingo
	Venezuela	Yucatan

EUROPE.

Algiers	England	Ireland
Bavaria	Finland	Norway
Belgium	France	Russia
Denmark	Holland	Spain
	Sweden	

ASIA.

Assam	China	Japan
Burma	India	Manchuria

AFRICA.

Algeria	Egypt	Sudan
Cape Colony	Natal	Tunis

AUSTRALIA AND NEW ZEALAND.

Hawaii	Tasmania	Western Australia
New Zealand	Victoria	

During 1808 three leading British railways purchased 80 American locomotives, of which 70 were supplied by the Baldwin and 10 by the Schenectady Works. These railways were the Midland, Great Northern, and Great Central. The reason for doing so was the great engineering strike of the previous year which caused all the engineering works of Great Britain to be overcrowded with orders and unable to meet the demands upon them. These American locomotives have been subjected to severe criticism and efforts have been made to show that they are less economical than English locomotives. No authenticated facts have, however, been produced, and the statements made have been inconclusive. Large shipments have been made to India, Egypt, and South Africa, largely because of the same reasons, which have been

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similarly attacked. The demand for American locomotives is constantly growing and further increase of the export business may be expected.

The market price of a locomotive in 1832 appears to have been \$4,000, this sum having been agreed upon between Matthias W. Baldwin and the Philadelphia, Germantown and Norristown Railroad for the locomotive Old Ironsides. The highest prices known in locomotive-building, as in other industries, were those obtained during the Civil War, when heavy freight or passenger locomotives commanded from \$30,000 to \$35,000. Prices declined after the close of the War to about \$7,000 for a 35-ton passenger locomotive in 1878-9. During the so-called boom of 1880-1, prices again rose to about \$15,000 each for similar passenger locomotives; but since that time there has been a constant reduction in the price per pound, the weights of locomotives gradually increasing with the demands of increasing traffic, while prices remained nearly stationary until 1896 at about \$8,000 to \$9,000 each for average passenger locomotives, and from \$9,000 to \$10,000 each for average freight locomotives.

In 1897, with the introduction of the 50-ton steel car, a further considerable advance began in the weight and power of locomotives. The ordinary weight of Consolidation freight locomotives, which had been from 60 to 70 tons, was increased to 80 to 100 tons, and a number were constructed as heavy as 115 tons (of 2,000 pounds) exclusive of tender. The extraordinary business activity which began in 1898 increased the earnings of railroads and therefore their purchasing power. On this account and on account of the heavier classes of locomotives introduced and on account of higher costs of materials and labor, the average price of freight locomotives advanced to about \$15,000 or \$16,000, and the average price of passenger locomotives to almost the same figures. The demand for power sufficient to handle heavy trains at sustained high speeds, capable of accelerating speed rapidly after starting caused the introduction of heavier types of passenger locomotives. The eight-wheel or American type became inadequate to these increased demands, and the ten-wheel engine, except for heavy grades, involved the disadvantages of comparatively small driving wheels, an unsatisfactory form of firebox, an adhesion altogether in excess of actual requirements under ordinary conditions, and excessive resistance within the machine itself. To meet these objections the Atlantic type was brought out by the Baldwin Locomotive Works. It is substantially a ten-wheel locomotive with very large driving-wheels, and the rear pair of driving-wheels replaced by a pair of trailing wheels. The lower side of the trailing wheels permits of a deep firebox of large grate and large cubic area for thorough combustion. An enormous boiler capacity is available in proportion to the adhesion. The driving-wheels are closely coupled and the total wheel-base is long enough to give great smoothness of motion at high speed, and is sufficiently flexible.

The importance of fuel economy was appreciated in Europe earlier than in the United States. Progress had been made in the development of the compound locomotive by Lindner, Von Borries, La Page, Worsdell, Webb, and others. W. S. Hudson, superintendent of the

Rogers Locomotive Works, designed a two-cylinder, or cross-compound, locomotive, as early as 1873, but it was never built. In 1882 Henry D. Dunbar designed and patented a four-cylinder tandem compound locomotive, which was tested on the Boston and Albany Railroad. In 1889 the Pennsylvania Railroad imported from England a compound locomotive of Webb's pattern for experimental service. The same year Samuel M. Vauclain, superintendent of the Baldwin Locomotive Works, designed a four-cylinder compound locomotive, in which a high-pressure and a low-pressure cylinder are placed one above the other on each side of the locomotive, both formed within a single casting, together with the steam-chest, and occupying the same place as the ordinary single-expansion cylinders. The two piston-rods connect to a common cross-head, but back of the cross-head pin there is no essential difference from the ordinary engine. About the same time A. J. Pitkin, superintendent of the Schenectady Locomotive Works, brought out a two-cylinder, or cross-compound, locomotive, having a form of intercepting-valve differing from those previously used abroad. The general interest in compound locomotives, together with the powerful influence of two of the most prominent works in the country, led to the rapid introduction of compound locomotives, and caused other locomotive-builders to bring out similar designs. There have since been built in the United States about 3,500 compound locomotives, of which more than 3,000 are of the Vauclain pattern, some are of the four-cylinder "tandem" type, and most of the remainder are of the two-cylinder or cross-compound type. The compound locomotive is unquestionably a step in advance, realizing an economy of 15 to 40 per cent, according to the service in which it is employed.

The most conspicuous improvement in transportation, which resulted from the introduction of steam-power, was the great increase in the capacity for high speed. Peter Cooper's first locomotive is said to have attained a speed of 18 miles per hour. Baldwin's Old Ironsides is recorded as having attained a speed of 60 miles per hour for a short distance. Speeds of 60 miles per hour have therefore been known from the early days of American railways. The real progress of locomotive development has not been so marked in increasing the capacity for speed as in increasing the weight of trains which can be hauled with certainty at rates of speed which have previously been regarded as phenomenal. Up to 1889, when the compound system was introduced, there did not exist a demand for sustained speeds exceeding 50 miles an hour. In November 1892, one of Vauclain's compounds, No. 385, running on the Philadelphia and Reading and the Jersey Central railroads, between Philadelphia and Jersey City, with a train of four heavy cars, attained a speed of 97 miles per hour by covering one mile in 37 seconds. On 10 May 1893, locomotive No. 999, of the New York Central Railroad, covered a mile in 32 seconds, equivalent to 112½ miles an hour, hauling the Empire State express, consisting of four heavy cars. On 19 July 1893 engine No. 682, a Vauclain compound, of the Philadelphia and Reading Railroad, hauled a train of nine loaded passenger cars from Winslow Junction to Pleasantville, 26 miles, in 22 minutes, or at the rate of 70.9 miles per hour, and on 27 August,

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the same locomotive hauled 17 loaded passenger cars over the same distance in 27 minutes, or at the rate of 57 miles per hour. These performances are remarkable for the weight of the trains hauled. On 11 Sept. 1895, a locomotive of the New York Central and Hudson River Railroad hauled the Empire State express, consisting of four cars, from New York to East Buffalo, 436½ miles, in 407½ minutes, being an average speed of 64.26 miles per hour. Beginning with the summer of 1896 the Philadelphia & Reading Railroad operated during the months of July and August a train of five and six passenger cars between Camden and Atlantic City, 55½ miles, in 48 minutes. These runs have been made with great regularity. The locomotives used are Atlantic type, Vauclain compounds, with Wootten boilers and 84-inch driving-wheels. It is believed that the steam locomotives of to-day possess capacity for running at as high a speed as is required by public demand, or as is consistent with the commercial conditions governing the business of transportation.

During the past few years the general substitution of electric power for horse-power and for other means of propulsion on tramway lines has caused electricity to be regarded as perhaps a rival of steam, or at least as a competitor which may prove to be a serious rival in the future. The progress of electrical science is so rapid that what is written to-day is obsolete tomorrow. What we regard as impossibilities now may shortly become established facts. In 1840 Davis & Cook constructed a walking-beam engine with a zinc and copper battery, using a solution of blue vitriol. In 1842 Davidson, of Scotland, constructed a five-ton electric locomotive, which was actuated by 78 pairs of 13-inch-square zinc and iron plates in sulphuric-acid solution, and propelled itself at the rate of four miles an hour. In 1844 Channing conceived the idea of substituting electro-magnets for permanent steel magnets, and of exciting the field magnets by an electro-magnetic machine. This idea was subsequently developed by Henry Wilde, Manchester, England, between 1863 and 1866. In 1847 Farmer constructed an electro-magnetic locomotive having 48 pint cup cells of Grove nitric-acid batteries, which drew a car containing two passengers on a track of 18 inches gauge. In 1850 Page, of Washington, constructed an electro-magnetic locomotive of 16 horse-power, actuated by 100 cells of Grove nitric-acid batteries, having platinum plates 11 inches square. This machine propelled a car carrying a dozen or more persons on the Baltimore and Washington Railroad, at a speed of 19 miles an hour. In 1851 Thomas Hall, of Boston, constructed and exhibited a small electric locomotive taking its current from a stationary battery by means of the rails and wheels, and arranged automatically to change the current and return at the end of the track. In 1860 he made a more elaborate model called the Volta, which was exhibited at the American Mechanics' Fair. In 1859 Farmer invented what he designated the self-exciting dynamo, which was constructed in 1860. Improvements on this were made by Wheatstone, Leaman, and Ladd in 1867, and by Gramme in 1871. It made possible the substitution of the dynamo for the galvanic battery, and permitted the generation of electricity at low cost. The first experiments in the use of

electrical locomotives on steam roads appear to have been made by Leo Daft on the New York Elevated Railroad with a motor of 12½ horse-power. In 1886 Frank J. Sprague conducted experiments on the same road with trains of individual motor-cars. In 1891-2 the Thomson-Houston Electric Company built a locomotive of about 125 horse-power for freight service at Whitinsville, Mass. This locomotive handles an aggregate load of 200 to 300 tons at a speed of five miles an hour. In 1892 the North American Company ordered from the Baldwin Locomotive Works a powerful electric locomotive to be constructed from the plans of Sprague, Duncan & Hutchinson Company, Limited. This locomotive was completed in 1894 and weighed 67 tons. It had four pairs of wheels connected by coupling-rods, and the field magnets were hung from the driving-boxes, while the armature was hung on the driving-axle. In 1892 the General Electric Company undertook the construction of an electric locomotive for the tunnel of the Baltimore and Ohio Railroad in Baltimore. This locomotive was completed in 1895, and was designed to weigh 90 tons and develop 1,500 horse-power. In 1892-3 the General Electric Company equipped in the grounds of the World's Columbian Exposition at Chicago, and operated during the period of the Exposition in 1893, an elevated railroad known as the Intramural Railway. Its mechanical success was such that in 1894 the Metropolitan West Side Elevated Railroad, which had been designed as a steam line, countermanded an order for 25 steam locomotives and substituted electric power. In 1895 the Lake Street Elevated Railroad of Chicago discontinued the use of steam locomotives and substituted electric power. The same year the New York, New Haven and Hartford Railroad equipped its Nantasket Beach branch electrically for experimental purposes, and the Pennsylvania Railroad equipped a branch road at Mt. Holly for the same purpose. In 1895 the Baldwin Locomotive Works consummated a working agreement with the Westinghouse Electric and Manufacturing Company, for the production of electric equipment for railway service. Large numbers of electric locomotives have been constructed for mine haulage, and for handling freight in industrial establishments. Electric tramways are operated in every city and town, while traction lines, some of such substantial construction as to resemble railways, are rapidly developing throughout the country. Electricity has become recognized as the only suitable power for operating elevated railroads in cities. The Manhattan Railway in New York has installed electric traction, and American enterprise is electrically equipping several lines in the city of London. There is a large field for electricity in railway work, and it is probable that after it has been applied to switching and suburban service in the great cities, public opinion will compel the abandonment of steam locomotives in these precincts.

Although the steam locomotive is more prominently brought to the attention of the public, and is therefore more popular and better known, yet it has no greater effect on daily life than other steam-engines. Mention has been made of steam-power applied to transportation in navigation on the ocean and on inland waterways, but besides this use for steam it supplies a

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thousand wants of daily life, such as the furnishing of the water-supply of great cities, the driving of industrial machinery, the lighting of streets and houses, the running of elevators in high modern buildings, the extinguishing of fires, and the operating of the electric tram-car. For many years the development of the stationary engine and the marine engine were identical. The first experimental steam-engine built in the United States is said to have been constructed in 1773 by Christopher Colles, a lecturer before the American Philosophical Society at Philadelphia. In 1787 John Fitch launched on the Delaware River at Philadelphia a steam-boat propelled by paddles, which attained a speed of 13 miles per hour, and in 1796 he experimented in New York with one operated by a screw. His efforts were closely followed by those of Robert Livingston. About the same time other mechanics were devoting attention to the problem of steam navigation, among them Samuel Morey, Nathan Read, Nicholas Roosevelt, Oliver Evans, Robert Fulton, John Stevens, and others. Transatlantic steam navigation began in the year 1819, when the American steamer Savannah made the trip from Savannah to St. Petersburg. The development of the marine engine through its various forms of single expansion, compound, and triple expansion cylinders has resulted in the powerful mechanisms which drive the St. Louis, the St. Paul, the Oceanic, the Deutschland, and the Kronprinz Wilhelm at the rate of 500 to 600 miles per day. This development has resulted from the labors of many, among whom may be mentioned John and Robert Stevens, Robert Thurston, James P. Alair, the Copelands, and John Ericsson. Since 1850 the improvements have been rather in details of construction than in any marked change in type. The engineer has striven and is still striving for the highest efficiency with the greatest degree of economy. The introduction of what is known as the Corliss valve gear marks probably one of the greatest eras in engine building. This is a device by which the steam is admitted into the cylinder for any desired portion of the stroke, and the point of cut-off automatically maintained by the governor without affecting in the least the free opening of the exhaust. Many devices had been introduced before this time for the purpose of using the steam expansively, among which may be mentioned that of Frederick E. Sickles, in 1841, whose drop cut-off with detachable valve gear was used in this country until 1849, when George H. Corliss brought out the improved expansion gear which bears his name, and which is used to-day by builders all over the country. The adoption of the surface condenser may also be noted as an improvement of great practical utility in the economy of that class of engines to which it is adapted.

As the country developed, there was an ever-increasing call for smaller engines with higher speed and higher steam pressure. Excessively high pressures had already been experimented with as early as 1823 by Jacob Perkins, who in 1827 constructed a single-acting engine in which steam of 800 pounds pressure was used, and in the same year he made a compound on the Wolfe plan, in which he adopted a pressure of 1,400 pounds, expanded eight times. He even went so far as to propose to adopt a pressure of 2,000 pounds, using engines with small cylinder

dimension and cutting off the admission at one sixteenth of the stroke. For obvious reasons these excessive pressures were not adopted in general practice, but the experiments had the effect in later years of calling the attention of builders to the greater economy of high pressure steam, and engines and boilers were adapted to its use in a moderate degree. This caused inventors to consider different plans by which high pressures could be utilized and high speed engines constructed. A number of designs were executed, among which may be noted the Westinghouse, which is a double-cylinder, single-acting engine. The low cost and simplicity, combined with a high degree of efficiency, have brought this engine into extensive use.

The steam turbine has recently attracted much attention on account of its remarkable steam economy and wide range of load. The force of the steam is converted into work through the impact and reaction due to its velocity, which is increased by liberation and expansion. The advantages obtained over the ordinary steam engine are the continuous rotative action, and the absence of dead centres and consequent mechanical complications, and the absence of the strains suddenly applied and reversed which are unavoidable in a reciprocating engine. Two systems are, at present, in use, the De Laval and the Parsons. The former is on the principle of the axial jet turbine water wheel, the jet of steam being brought in contact with the blades of the turbine wheel, at the proper angle, and passing through to the discharge. In order to obtain the greatest effect, it is necessary that the turbine attain a high velocity, sometimes 30,000 revolutions a minute. This excessive speed is reduced to the normal by a specially designed system of gearing. The Parsons steam turbine is manufactured by the Westinghouse Machine Company, and it differs from the De Laval system in that the main armature or drum can be run at a lower rate of speed with economical results. The cylindrical steam chamber is of varying internal diameter and provided with numerous rows of curved guide plates or vanes. Central drums of correspondingly varying diameter, on which are secured similar rows of blades spaced to fit between the stationary rows, form the rotating portion, and its shaft may be coupled direct to the armature of a dynamo or receive a pulley for belt drive. The stationary rows of blades serve to guide the steam in the proper direction for doing its work upon the movable ones. The steam is introduced at the small end of the chamber and acts first upon the smaller set of blades; from this it is expanded into the larger portion of the chamber and acts upon the next larger set of blades and so on throughout the series. By this arrangement which increases the diameter of the rotating parts, the speed of the shaft is reduced and the necessity of back gearing is avoided.

Much attention is likewise being directed to the economies available by the gas-engine. Such engines are now working in units of upward of 700 horse-power and, using gas prepared in special generators, give favorable indications of effecting further important economies in the conversion of heat into power.

The competition among engine builders has caused marked changes to be made in simplifying and reducing the cost of manufacture. Probably no change which has been made equals that



ON THE VICTORIAN RAILWAY IN AUSTRALIA.

An American engine drawing 781 tons in 54 cars.



THIRTY YEARS' ADVANCE IN LOCOMOTIVE BUILDING.

Two locomotives on the Denver and Rio Grande: the big consolidation engine typifies modern American railroading; the superseded little one was the "mighty iron horse" of the seventies.

LOCOMOTIVES

adopted by nearly all builders of what may be called the merchantable engine, of reducing the number of main parts to a single column or bedplate, in which the revolving and reciprocating parts are supported and the cylinder secured directly to this column or bed. Engines of this class, both vertical and horizontal, are manufactured by builders all over the country, and perhaps no better estimate can be derived of the advance in this particular than to consider that in 1795 there were exceedingly few in this country who were interested in the introduction of the steam-engine, whereas now scarcely a town of any importance exists which does not boast of one or more shops where steam-engines are built. The marked advance in the efficiency of the steam-engine may be seen when we consider that previous to 1850 it took from 5 to 8 pounds of coal and something like 80 pounds of water per horse-power per hour to operate what was then considered the best class of engine, whereas to-day the same work is done with an expenditure of 1.8 pounds of coal and 15 pounds of water per horse-power per hour. The manufacture of stationary engines is so widely distributed and so extensively followed that neither in the United States census nor in other compilations of statistics is it possible to determine the number of men employed, the number of employers interested, the amount of capital involved, or the value of the productions of this branch of engine-building.

The steam fire-engine is an important factor in securing the safety of human life and property, and the improvement in such engines within fifty years has been great. Captain John Ericsson built a portable steam fire-engine, which was tested in New York city in 1842, but was not put into regular service. The time required for raising steam was then eighteen minutes. Steam fire-engines were put into permanent service in Cincinnati about 1853, and at that time steam could be raised in less than four minutes from the time the torch was applied. Economy is not a matter of prime importance in steam fire-engines, the first requisites being power and portability. Modern machines of beautiful design and superb workmanship can be drawn by two horses, and can be made ready for delivering enormous quantities of water within three minutes after the sound of the alarm. This comparatively small apparatus can throw a stream of water over all except the highest buildings in the large cities, and can run for hours without damage. The boiler of the steam fire-engine is one of the most powerful for its weight used in any practical work. The fire-engines manufactured in the United States are admittedly superior to those manufactured elsewhere. (See FIRE PROTECTION.) This superiority has doubtless resulted from the need of the most efficient apparatus to protect cities largely built of wood, and which are much more subject to conflagration than those of older countries, where brick and stone are the principal materials used in construction.

Other important branches of the industry are the manufacture of steam road-rollers and of motor vehicles. See AUTOMOBILES.

While the progress of steam-engineering during one hundred years has largely revolutionized the methods of living, this development has not reached its termination. On the contrary, the engines and boilers which have recently been

used in torpedo-boats, the experiments of Maxim in England, and of Langley in the United States, introducing steam-engines and boilers of power heretofore inconceivable for their lightness, and the light engines and boilers which are used in road carriages, indicate that we may expect in the near future an enormous saving in the amount of coal used in producing power, and in the convenient subdivision of power for a great variety of uses. It is reasonable, therefore, to expect that this advance will continue at an accelerated pace, and it may be predicted that the further development of steam engineering will result in the increased conservation of the world's resources and in an added contribution to the comfort and happiness of mankind.

ALBA B. JOHNSON,
Baldwin Locomotive Works.

Locomotives, Compound. The compound locomotive, like the compound stationary engine, is designed to save fuel by requiring less steam to do a given amount of work. A compound locomotive is not necessarily any more powerful, nor any faster, than a simple engine, but will do the same work with less coal and for less money. A compound locomotive, however, may be both faster and more powerful than a simple engine for the reason that as the compound uses less steam (q.v.) doing the same work, the same boiler that supplies a simple engine will do more work with compound cylinders.

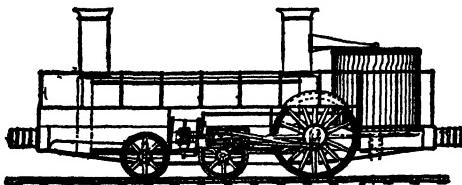
The principle of compounding steam cylinders is to let the exhaust from the high pressure cylinder go to the low pressure and drive that before escaping to the atmosphere. This is done to divide the expansion between the two cylinders instead of doing it in one, the aim being to avoid excessive condensation. Steam at 200 pounds gauge pressure per square inch is at a temperature of 387 degrees, while the back pressure or pressure of the steam that is being pushed out of the cylinder by the returning piston will average about 5 pounds or 227 degrees. The steam then would expand from 200 down to 5 pounds or a difference of 160 degrees of heat. The cylinder cools down with the steam (though not so rapidly) and, presenting a comparatively cool surface to the next admission of steam, condenses a portion of it. The heat from the condensed steam goes to warm the walls of the cylinder which are again cooled by the expansion.

The ideal compound locomotive seems to be one that can be used either simple or compound at any time or for any length of time at the will of the engineer. When used in either condition it should be of equal power on each side, and when running simple should be as economical as any simple engine under the same conditions. It should of course only be used simple in starting or in getting a train over a bad part of the road. The engine should not be worked simple any more than necessary, as in the compound position it is saving the fuel. Nor should an engine working compound be hooked up to cut off as short as in working simple.

The first compound locomotive of which we have record is that of Thomas Craddock who began experimenting in April 1844. In his book, 'The Chemistry of the Steam Engine,' published in London in 1848, he proclaims the superiority of the compounding feature and de-

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scribes an engine in which "one eccentric, one valve, one crosshead, one connecting rod and one steam box serve both cylinders." He evidently abandoned this, as in the engine shown



Compound Locomotive of Thomas Craddock. 1848.

he used two crossheads and two connecting rods, although he used but one valve. He also used a fan condenser as will be seen, and claimed a vacuum of 24 inches. The cylinders of this engine were 6 and 14 inches respectively, or a ratio of 1 to 5.4. Another plan of his was also shown, but there is no record of its having been built. He used 115 pounds of steam, but predicted the use of 200 pounds in the nearer future than it was realized. His patent was dated 3 Dec. 1846. Other early inventors were: John Nicholson, James Samuels and Frazer Selby, all English.

The first American compound locomotive was built at the Shepard Iron Works, in Buffalo, from the designs of Perry & Lay in 1867. A switching engine of the Erie Railroad had their tandem cylinders placed on it. This engine worked nicely and ran for several years, but coal economy was still a question of the future, and as it was ahead of its time, the idea was abandoned. The next compound was of the two-cylinder type and was built in 1870 by the Remington Arms Company, at Ilion, N. Y., from the design of William Baxter. This was used on a suburban road, the Worcester and Shrewsbury, and gave good service. It has an intercepting valve under control of the engineer, and could be run as a simple engine any length of time. On 11 March 1873, a patent was granted William S. Hudson, of the Rogers Locomotive Works, Paterson, N. J., for a superheater in smoke-box, so arranged as to reheat the steam passing from high pressure to low pressure cylinders of a two-cylinder compound. This is sometimes cited as the first two-cylinder compound, but in reality none were built, and it was preceded by others as we have seen. About this time the compound began to excite more interest both in England and on the Continent. Prominent among them were Anatole M. Mallet, Francis William Webb, August Von Borries and Robert Lindner.

This brings us to the later American designs, with which we are most interested. On 25 June 1880 a patent was granted to Samuel M. Vauclain, of Philadelphia, for a four-cylinder type of engine. Cylinders were parallel and connected to one crosshead. One patent shows two piston valves, another shows but one, which is the style now used and known as either the "Vauclain" or "Baldwin" type. It is rather a curious matter of patent history that on 18 June 1889, one week earlier, Joseph Lewis, of South Evanston, Ill., obtained a patent for a similar engine, except that the one piston valve was rotated by gearing instead of being a reciprocating valve. This engine has never been in service, however.

On 10 Dec. 1889 Albert J. Pitkin obtained his patent on what is now known as the Schenectady compound. As first built it went into compound automatically and could not be run as a simple engine except at the start, but this has been modified so as to make it optional with the engineer. On 27 May 1890 Henry F. Colvin, of Philadelphia, obtained a patent on the application of an automatic reducing valve to admit live steam to low pressure cylinder just in proportion to ratio of cylinders, so as to keep the total power on each side equal. This engine was built by the Pittsburg Locomotive Works. The Pittsburg compound has the intercepting valve on the high pressure side and it is not moved to compound automatically, but is moved independent of pressure in the receiver. It can be run simple any length of time (as is now common with them all), but this and the Rhode Island were the first to have this feature, except the Baxter before mentioned. In starting, the high pressure cylinder receives steam as usual, and the steam for the low goes through the reducing valve into the receiver, a separate passage being provided for the high pressure. Moving the valve into compound position shuts the live steam from the receiver and closes the independent exhaust of the high pressure cylinder and turns it into the receiver to the low.

The late C. H. Batchellor patented what is known as the Rhode Island compound on 22 Sept. 1891. This was similar to the Pittsburg engine in some ways, but had the intercepting valve on the low pressure side and goes into the compound automatically by an accumulation of reserve pressure. The Richmond compound (Mellin System) has the intercepting valve on the low pressure side, and is moved automatically by the receiver pressure.

The Richmond engine was the first to use an overpass valve. With an engine running without steam or "drifting" as railroad men call it, the cylinders become air-pumps. The air forced out drafts the fire at a time when it is not needed, and on mountainous roads cuts quite a figure in coal consumption. While this is present in any engine, it is aggravated in the large cylinder of a compound, and is usually met by the use of a vacuum valve at each end of the cylinder. These admit air and do not overcome the needless draft on fire. It is often charged that two-cylinder compounds "nose" around on account of developing more power on one side than the other, but this would seem to be largely imagination. A simple engine is always working one-sided in so far as one side is at maximum while the other is a minimum power, and it is nothing out of the usual to bring an engine in with one side uncoupled, the other doing all the work. The fallacy of one-sided working when running simple on account of large cylinders is shown by the action of reducing valve and the fact that careful tests show a variation of less than 2 per cent with careful designing. This is no more than is apt to be found on any engine after having its cylinders bored larger than the other—being simply trued up. The fact that a compound engine has more power when working simple than in compound is generally taken as showing that the reducing valve does not act quickly and the large cylinder gets more than its proportion of steam. That this is not the case we learn that the safety valve in the receiver passage—set to

OPERATION OF LEADING COMPOUND LOCOMOTIVES



1. Schenectady Compound — simple.

2. Pittsburg Compound — working compound.
Pittsburg Compound — simple.

LOCOMOTOR ATAXIA — LOCUST TREES

blow at the determined receiver pressure—rarely or never pops. The actual reason is that the high pressure cylinder is relieved by its back pressure, which adds quite a little to the effective forward pressure.

The last few years has brought the tandem compound to the front after the lines of Perry and Lay in 1867. These are the Schenectady, the Colvin-Wightman and the Baldwin. They are very heavy and powerful engines and are capable of heavy work. They are necessarily heavy in front and some of them are very inconvenient to get at and repair. This, however, is more the fault of the designer than the type. The balanced engine, too, is coming to the front, with one set of cylinders driving the wheels from the outside and the other by cranked axles on the inside. They are a development of the old Shaw and Strong locomotives. In France this is known as the DeGlehn type.

The points to be considered by the mechanical engineer, as in any case, are the construction from a mechanical point of view, the number of parts, their strength or delicacy, and the likelihood of failure. Also the number of ground joints, if any, and the result if they are not kept tight. As it is a simple case of dollars and cents, the additional first cost and cost of repairs as compared with a simple engine must be weighed against the fuel economy. If the net results were not satisfactory, the compound would not be increasing in use as rapidly as it is at present. That the compound locomotive has come to stay and is doing good work there is no doubt, in spite of the opposition in some quarters, and a fuel saving of from 10 to 30 per cent is being obtained in nearly every instance. Neither is the cost of repairs necessarily high. For a more detailed history of the compound locomotive, consult the Reports of the Franklin Institute on the subject.

FRED H. COLVIN, M. E.,

Author of 'American Compound Locomotives.'

Locomotor Ataxia, a disease of the nervous system, usually occurring in adults from 40 to 50, and characterized by pain, inability to walk, and by progressive weakness which leads finally to death. The malady is long drawn out, and while not entailing, as a rule, a great amount of physical pain, causes extreme inconvenience to the patient. In the vast majority of patients it first shows itself by neuralgic pains of the lower extremities. Thus, there may be acute darting and lightning-like pains, lasting from half an hour to an hour or two, about the ankles, in the instep, shooting up the leg, or in the thighs. Occasionally these pains are present in the arms and trunk. They are frequently diagnosed as neuralgia, and it is not until development of the symptoms of ataxia (q.v.)—inability to walk in the dark, and to place the foot or hand where the mind wishes it to be placed—that the true nature of the constant neuralgic pains is recognized. With the gradual development of the inability to walk there may be a number of other symptoms—acute, lightning-like pains in the stomach, intense, sometimes acute, pain in the bladder, sometimes loss of voice, etc. There may be patches of anesthesia over the body and there is usually progressive muscular weakness. Loss of knee-jerks is an important early sign.

Associated with ataxia of the legs, which prevents the patient from walking readily in

the dark, or up and down stairs, there may be some ataxia in the hands, whereby the finer movements of buttoning the clothing, of writing, etc., may be interfered with. A very constant and usually a very early sign of locomotor ataxia consists in certain changes in the reactions of the pupil of the eye to light. This symptom is technically known as the Argyll-Robertson pupil, and shows a fixed pupil when exposed to the influence of light, but a pupil that dilates or contracts normally when tested for its powers of accommodation. Thus the pupils of a patient who has this symptom contract on looking at a near object and dilate on looking at a far object; but if a candle or beam of light is thrown suddenly on the eye, normal quick contraction of the pupil is diminished or absent. The Argyll-Robertson pupil is sometimes found as early as the neuralgias, and a diagnosis may often be made on that alone.

The progress of the disease is usually very slow; remissions occur, which give great hope to the patient and afford ample opportunities for all forms of charlatanism; but the final outcome is usually hopeless. Many conditions of the spinal cord are known in which some of the symptoms of locomotor ataxia are present, chronic neuritis from alcoholism being one. As many of these are recoverable, the diagnosis of locomotor ataxia is an extremely difficult one, and can be made only by the competent specialist. Consult: Starr, 'Organic Nervous Diseases' (1903); Marie, 'Maladies de la Moelle.'

Lo'cris, the parts of ancient Greece inhabited and named after the Locrians, the oldest Grecian peoples. There were four branches—the Epicnemidian, the Opuntian, Ozolian, and Epizephyrian Locrians, the last a colony from the Ozolian stock, living in Lower Italy. Their capital, Locri, was one of the most powerful, splendid, and wealthy cities of Magna Græcia.

Lo'cus, in mathematics, when the conditions of a problem are not sufficient to determine the absolute position of a point, but restrict it to a certain line (or lines), this line is called the locus of the point. Thus, if the base and area of a triangle are given, the locus of the vertex is a straight line parallel to the base; or if the distance of a point from another point is in a given ratio to its distance from a given fixed line, the locus of the point is a conic section.

Lo'cust. See GRASSHOPPERS; CICADA.

Locust Trees, a genus (*Robinia*) of leguminous trees and shrubs. The species have odd-pinnate leaves; pea-like flowers in drooping racemes; and pods containing several bean-like seeds. They are all useful for ornamental planting, and one species, *R. pseudacacia*, is highly valued for its timber. This species, which is the best known, and is also called false acacia and black locust, is the largest of its genus, attaining heights exceeding 75 feet and girths greater than eight feet in the rich alluvial soils of Tennessee and Kentucky. Its hard, tough, close-grained yellow wood is especially useful for ship-building, fence-posts, and other purposes in which great durability is required. It is also employed for making cog-wheels, tree-nails, for the interior finish of houses, for furniture and other uses where a highly polished wood is needed. It is the favorite material for policemen's clubs, not only because of its weight and toughness, when

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material has also been advanced with respect to deposits in the United States; but the general opinion of geologists favors the theory of aqueous origin for the whole formation. Consult: Sixth Annual Report of the United States Geological Survey (1888); Chamberlin and Salisbury, 'The Driftless Area of the Upper Mississippi Valley'; McGee, 'The Pleistocene History of Northeastern Iowa,' in the United States Geological Survey, Eleventh Annual Report (1891); Geikie, 'Prehistoric Europe' (1881).

Loewe, Wilhelm (also called Loewe-KALLE), German politician: b. Olvenstedt, near Magdeburg 1814; d. 1886. He was educated at Halle, and adopted the medical profession. Elected in 1848 to the Frankfort Parliament, he acted with the extreme party of democracy; became first vice-president of the Parliament; and later, at Stuttgart, was its president. Charged with sedition in this, which was considered a revolutionary procedure, and once acquitted, he was nevertheless sentenced to life imprisonment for contumacy. After some years in Switzerland, France, and England, he came to this country, and for eight years practised medicine in New York. Availing himself of the amnesty in 1861, he returned to Germany, and in 1863 was elected to the Prussian House of Deputies. Four years later he was a Progressist member of the North German Reichstag. Disagreeing with his party in 1874, on the military law, he attempted to form a new Liberal party. In the elections of 1881 he lost his seat.

Loewenthal, lē-vē-tal, Henry, American journalist: b. New York 15 May 1853. Trained in the public schools and the College of New York, he studied law at the Columbia College Law School, taking his degree in 1875. He began newspaper work on the New York *Tribune* as reporter in 1872. In 1875 he was appointed law reporter on the New York *Times* and acting city editor in 1878. In 1879 to 1893 he was city editor, and from 1873 to 1896 had charge of real estate matters. In August 1896 he became managing editor, a position he now (1903) holds.

Loewy, lē-vē', Maurice, French astronomer: b. Vienna 1833. He studied astronomy and was given a position in the observatory at Paris by Leverrier, and after the latter's death assisted Mouchez in the observatory of Montsouris. He is noted for his invention of the *Equatorial-coude*, or Elbow-equatorial, in which the observer remains seated at the upper end of the polar axis of the telescope, as if working with a microscope on a table, with the means of directing his view to any part of the heavens under his control. He also devised improved methods of determining the constants of astronomical refraction and aberration.

Lofoten, lō-fō'ten, or Lofodden, Norway, a group of islands off the northwest coast, stretching southwest to northeast about 175 miles. The largest are Andoen, Langoen, Hindoen, East and West Vaagen, and Flagstadöe. They have bold, precipitous, rugged, and deeply indented coasts, and an elevated, sterile interior, several containing mountains which, though not lofty, are covered with perpetual snow. Immense shoals of cod and herring frequent their shores, and extensive and valuable fisheries are

carried on. The principal cod-fishery beginning January–February, ends in April, but the herring-fishery continues, and furnishes an important branch of national revenue. In ordinary years about 4,000 boats, each manned by five hands, are employed. The celebrated whirlpool, the Maelstrom, is situated at the southern extremity of these islands. Permanent population of group, about 20,000.

Lof'tie, William John, Irish Anglican clergyman, writer on antiquities: b. Tandragee, County Armagh, 25 July 1839. He was educated at Trinity College, Dublin, and after holding temporary Church appointments, became assistant minister of the Chapel Royal, Savoy, in 1871. He joined the staff of the 'Saturday Review,' and in 1894 that of the 'National Observer.' As a writer on antiquarian subjects he successfully combines learning and picturesque statement. He has published, 'Round About London' (1877; 4th ed. 1880); 'Plea for Art in the House' (1877); 'Memorials of the Savoy' (1879); 'A Ride in Egypt' (1879); 'A History of London' (1883); 'Authorized Guide to the Tower of London' (1886); 'London' (1887); 'Windsor' (1887); 'Westminster Abbey' (1890); 'The Cathedral Churches of England' (1892); 'Inigo Jones and Wren' (1893); 'Inns of Court and Chancery' (1894); 'London Afternoons' (1901); etc.

Lof'tus, Augustus William Frederick Spencer, English diplomatist: b. 4 Oct. 1817; d. 9 March 1904. He entered the diplomatic service in 1837 as attaché at Berlin and was likewise attaché at Stuttgart in 1844. He was secretary to Stratford Canning in 1848, and after serving as secretary of legation at Stuttgart (1852), and Berlin (1853), was envoy at Vienna (1858), Berlin (1860) and Munich (1862); became ambassador at Berlin 1865, to the North German Confederation 1868–71, and to Saint Petersburg 1871–9. He was governor of New South Wales 1879–85. He published 'The Diplomatic Reminiscences of Lord Augustus Loftus' (1892–4).

Log, an apparatus used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the common log. It is a piece of thin board, forming the quadrant of a circle of about 6 inches radius, and balanced by a small plate of lead, nailed on the circular part, so as to swim perpendicularly in the water, with the greater part immersed. The log-line is fastened to the log by means of two legs, one of which is knotted, through a hole at one corner, while the other is attached to a pin fixed in a hole at the other corner, so as to draw out when sufficient force is exerted on it. The log-line, being divided by means of knots of colored cloth into certain lengths, which are in proportion to an equal number of geographical miles, as a half or quarter minute is to an hour of time, is wound about a reel. The whole is employed to measure the ship's head-way in the following manner: — The reel being held by one man, and the half-minute glass by another, the mate of the watch fixes the pin and throws the log over the stern, which, swimming perpendicularly, feels an immediate resistance, and is considered as fixed, the line being slackened over the stern

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to prevent the pin coming out. The knots are measured from a mark on the line at the distance of 12 or 15 fathoms from the log. The part of the line between the log and this mark is called the *stray-line*. The glass is turned at the instant that the mark passes over the stern, and as soon as the sand in the glass is run out the line is stopped. The water then pressing on the log dislodges the pin, so that the board, now presenting only its edge to the water, is easily drawn aboard. The number of knots and fathoms which had run off at the expiration of the glass determines the ship's velocity.

Log-book, a book in which are officially recorded the proceedings on board a ship. In it the contents of the log-board are daily transcribed at noon, together with every circumstance deserving notice that may happen to the ship or within her cognizance, either at sea or in a harbor, etc. In addition to the weather, speed, astronomical observations, etc., the entries required to be made include convictions, offenses, punishments, conduct of crew, illnesses and injuries, deaths, births, and marriages, quitting the ship, wages of men entering the navy, wages of deceased seamen, sale of deceased seamen's effects, collisions—in short, every condition, occurrence, and transaction which comes under official notice. The log-book must be signed by master and mate, and certain other persons in particular cases.

Log Cabin and Hard Cider, a term used in American politics in the campaign of 1840. The Whig candidate for President, William Henry Harrison, was a military man of plain manners. One of the Democratic papers, scoffing at the Whigs for taking a candidate not of the first caliber, advised that Harrison be given a log cabin and a barrel of hard cider, and he would stay contentedly in Ohio. This was taken up by the Whigs, and really helped to make their candidate popular with the masses. Log cabins were erected in great numbers in the cities, and were carried in processions, accompanied with barrels of cider.

Log-rolling, in American politics, a term used for maneuvers of politicians, by which they seek to secure co-operation in carrying favorite measures through legislatures and other bodies. Generally log-rolling is employed by individuals who approach others in support of personal schemes and interests. The word was formerly very popular in the United States, but has become almost obsolete, being supplanted by the term "button-holing."

Logœdic (lög-a-ë'dik) **Verse**, in Greek and Latin poetry, a rhythm in $\frac{3}{4}$ time; now obsolete and are rarely found except in imitations of classic lyric measures. See METRE; RHYME.

Logan, lög'gan, English name of the American Indian chief Tah-gah-jute: b. about 1725; d. 1780. He was the son of Shikellamy, a celebrated chief of the Cayugas, who lived at Shamokin on the Susquehanna, and was called Logan from James Logan, the secretary of Pennsylvania and a firm friend of the Indians. In his early manhood he was known throughout the frontier of Virginia and Pennsylvania for his fine personal appearance, engaging qualities, and his friendship for the whites. About 1770 he removed with his family to the banks of the Ohio, where he gave way in a measure to in-

temperance. In the spring of 1774 his family were massacred, it was alleged, by a party of whites led by Captain Cresap, under the pretext of retaliation for Indian murders; but it is exceedingly doubtful whether Cresap had any connection with the transaction. Logan at once instigated a war against the scattered settlers of the far West, and for several months fearful barbarities were perpetrated upon men, women, and children. He disdained to appear among the chiefs who subsequently sued for peace, but sent by an interpreter to Lord Dunmore, the governor of Virginia, the noted speech explaining his conduct, which was first published in Jefferson's "Notes on Virginia." Its authenticity is open to much doubt, however. While intoxicated he attacked a party of friendly Indians and was killed by his relative Tod-hah-dohs in self-defense.

Logan, Benjamin, American pioneer: b. Augusta County, Va., about 1752; d. Shelby County, Ky., 11 Dec. 1802. He early crossed the Alleghanies and became a settler in Kentucky. He was an associate of Simon Kenton and Daniel Boone in the Indian fighting then constantly in progress on the frontier. During the Revolutionary War he was also active in the contests between the colonial frontiersmen and the British and their Indian allies. In 1776 he built one mile east of Stanford, Ky., on the site now called St. Asaph's Spring, the stockade known as "Logan's fort." When this fort had for weeks in 1777 been besieged by Indians, Logan made his way through the enemy's lines and traveled 150 miles to Holston where he obtained supplies and reinforcements. He participated as second in command in Colonel John Bowman's expedition against the Shawnees at Chillicothe, and led the force sent against the Indians under Simon Girty. His advance guard, through over-haste, was defeated at Blue Licks, and Logan himself did not reach the scene of battle until the succeeding day. In 1788 he commanded a force of 600 against the northwestern Indians. He was for many years a member of the Kentucky legislature; and sat also in the State constitutional conventions of 1792 and 1799. His prowess was celebrated on the frontier.

Logan, Celia. See CONNELLY, CELIA LOGAN.

Logan, Cornelius Ambrosius, American dramatist: b. Baltimore, Md., 1806; d. near Wheeling, W. Va., 1853. After a varied career as actor and manager he became a theatrical manager in Cincinnati in 1840. He made a vigorous reply to Lyman Beecher's attack upon the stage from the pulpit; and wrote several successful plays, such as: "Yankee Land" (1834); "The Way of Maine"; "A Hundred Years Hence"; a burlesque; "The Wood Dealer." He also wrote tales and poems.

Logan, George, American statesman and philanthropist; grandson of James Logan (q.v.), b. Stenton, near Philadelphia, 9 Sept. 1753; d. there, 9 April 1821. He was educated in England, subsequently studied medicine in Edinburgh, where he took the degree of M.D., and afterward returned in 1779 to America. For many years he devoted himself to agricultural pursuits, which he was one of the first in America to prosecute successfully in a scientific manner. He also served several terms in the Pennsylvania legislature. At the outbreak

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of the French Revolution he embraced with enthusiasm its democratic doctrines, and joined Jefferson and the republican party in opposition to the federalists. In 1798, the United States being then on the brink of a rupture with the French republic, he departed for France, under the idea that he might contribute to the preservation of peace. He was well received by Tallien and Merlin, then chief of the Directory, and returned to America with the assurance of the desire of the French government to renew amicable relations with the United States. But as he had taken with him letters of introduction from Jefferson instead of passports from the state department, he was denounced by the Federalists on his return as the treasonable envoy of a faction who had undertaken to institute a correspondence with a foreign and hostile power. He was coldly received by Washington and President Adams, and in the latter part of 1798 an act, known as the "Logan act," was passed by congress, making it a high misdemeanor for a private citizen to interfere in a controversy between the United States and a foreign country as he had done. He was subsequently elected to the United States senate, of which body he remained a member 1801-7; and in 1810, urged by the same philanthropic motives which had induced him to visit France 12 years before, he went to England in the hope of preserving peace. In 1797 he published "Experiments on Gypsum" and "Rotation of Crops."

Logan, James, American colonial statesman and author: b. Lurgan, Ireland, 20 Oct. 1674; d. Stenton, near Philadelphia, Pa., 31 Oct. 1751. By his own efforts he acquired a knowledge of the chief ancient and modern languages, and in 1699, being then established in trade in Bristol, England, accepted an invitation from William Penn to accompany him to America in the capacity of secretary. In 1701, upon the return of Penn to England, he was appointed provincial secretary, and subsequently filled the offices of commissioner of property, chief justice, and president of the council, discharging in the last capacity the duties of governor of the province for two years after the demise of Governor Gordon in 1736. The latter years of his life were passed at his country-seat called Stenton, in the pursuit of literature and science. His chief work, "Experimenta et Meletemata de Plantarum Generatione" (Leyden, 1739; London, translated from the Latin by Fothergill, 1747), an expansion of a paper on the growth of maize published in the "Philosophical Transactions" for 1735, was considered an important contribution to the science of botany. He was the author of two other Latin treatises of a scientific character published in Holland, of an English translation of Cicero's "De Senectute," published in 1744 by Benjamin Franklin, and of Cato's "Distichs," the latter in verse; and he left a variety of papers on ethics and philology. The translation of Cicero was the first original one of a classical author printed in America. His library, numbering about 2,000 volumes, was, in conformity with his desire, presented to the city of Philadelphia, and is deposited in a separate department of the Philadelphia library under the name of the Loganian library. He was a member of the Society of Friends.

Logan, John, Scottish poet and Presbyterian clergyman: b. Soutra, Midlothian, Scot-

land, 1748; d. London, 28 Dec. 1788. In 1773 he was licensed as a preacher, and from his eloquence and fervor in the pulpit soon became popular. In 1786, however, owing to intemperate habits and kindred reasons, he was constrained to leave the ministry and going to London there engaged in literary work. His name is now best known in connection with that of Michael Bruce and the controversial authorship of the "Ode to the Cuckoo." That Logan is entitled to a place among the minor poets of Scotland is sufficiently attested by his exquisite lyric, "The Braes of Yarrow."

Logan, John Alexander, American soldier and politician: b. Jackson County, Ill., 9 Feb. 1826; d. Washington, D. C., 26 Dec. 1886. He studied at Shiloh College, volunteered as a private in the Mexican War, became a lieutenant in the First Illinois infantry, after the war studied law, was graduated from Louisville University in 1851, was admitted to the bar, and was elected to the Illinois legislature in 1852 and 1856. In 1858 he was elected a representative in Congress as a Douglas Democrat, in 1860 was re-elected, but resigned his seat in 1861, and on 13 Sept. was appointed colonel of the 31st Illinois infantry. He led this regiment in the attacks on Fort Henry and Fort Donelson, and was wounded at the latter. On 5 March 1862, he was made a brigadier-general of volunteers, and after commanding the 3d division of McPherson's corps (the 17th) in the northern Mississippi campaign, became major-general on 26 Nov. 1862. He fought at Port Gibson, Raymond, Jackson, and Champion Hill, commanded the centre at Vicksburg, and was appointed military governor of the town upon its capture. In November 1863 he was made commander of the Fifteenth corps, which he led until the fall of Atlanta, save for a short period when in command of the army of the Tennessee. He then returned to take part in the Lincoln presidential campaign, but rejoined his corps, continued with it till Johnston's surrender, 26 April 1865, and afterward for a time commanded the Army of the Tennessee. In 1866-9 he sat in the 40th and 41st congresses as a Republican, and was also re-elected to the 42d, but before taking his seat was chosen by the Illinois legislature to the Senate, where he served from 1871 to 1877. He began legal practice in Chicago, but on 18 March 1879 again entered the Senate. While in Congress he distinguished himself by his eloquence. He was consistently opposed to the restoration of Fitz-John Porter to the army, and in June 1880 made a four-days' speech on the Porter bill. At the Republican national convention in Chicago in June 1884, he was a candidate for nomination to the Presidency, and after Blaine's nomination was nominated Vice-President by acclamation. Shortly after the defeat of this ticket, Logan was again chosen Republican senator from Illinois. Blaine said of him: "While there have been more illustrious military leaders in the United States and more illustrious leaders in legislative halls, there has, I think, been no man in this country who has combined the two careers in so eminent a degree as General Logan." Consult the "Life" by Dawson (1887).

Logan, Mary Simmerson Cunningham, American editor and journalist: b. Petersburg, Boone County, Mo., 15 Aug. 1838. She was

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married to John A. Logan (q.v.) in 1855 and since his death, in 1886, has edited 'The Home Magazine,' has contributed frequently to periodicals and has been editorially associated with the 'American Journal.'

Logan, Olive, American actress, lecturer and author: b. Elmira, N. Y., 16 April 1841. She is a daughter of Cornelius Logan (q.v.) and began her career as an actress in Philadelphia in 1854. She retired from the stage in 1868; since then has been a lecturer on social topics and a contributor to newspapers and magazines. In 1872 she was married to W. W. Sikes, a journalist (d. 1883). She has published 'Chateau Frissac' (1865); 'Photographs of Paris Life' (1861); 'Women and Theatres'; and 'Before the Footlights and Behind the Scenes: a Book about the Show Business' (1870), and is the author of several plays.

Logan, Stephen Trigg, American jurist: b. in Franklin County, Ky., in 1800; d. in 1880. After studying law and for a while practising in Kentucky he removed (1832) to Springfield, Ill., and there continued in the work of his profession. He became a circuit judge in 1835; was three times (1842, 1844, 1846) elected to the Illinois legislature; and was associated as law partner with Abraham Lincoln, from 1841 to 1844. He was one of those who in 1847 framed the new constitution of Illinois; was again elected to the legislature in 1854; joined the Republican party at its formation, and was a delegate to its national convention in Chicago in 1860, at which Lincoln was nominated for the presidency. His reputation as a lawyer was very high among the members of his profession, and for eminence at the bar he left a still honored name.

Logan, Sir William Edmond, Canadian geologist: b. Montreal 20 April 1798; d. Castle Malgwin, Cardiganshire, Wales, 22 June 1875. He was educated chiefly in Edinburgh; was for a time a clerk in London, and afterward became manager of a copper-smelting works in Swansea. While there he devoted himself to the study of geology. In 1840 he went to Canada, and he was the chief of the Geological Survey of that country 1842-70. His writings appeared in the annual reports of the Canadian Survey; in the Proceedings of the British Association, the Geological Society, etc. He was knighted in 1856; was a knight of the Legion of Honor, and recipient of the Wollaston medal from the London Geological Society. He published 'Geology of Canada' (1863). Consult 'Life,' by Harrington (1883).

Logan, Ohio, village, county-seat of Hocking County; on the Hocking River, and on the Columbus, Hocking & Toledo railroad; about 45 miles southeast of Columbus. It is situated in the natural gas belt, and in the vicinity of some good farm lands. Nearby is found clay suitable for pottery and bricks. Its chief manufactures are flour, furniture, brick for paving and building, pottery, foundry products, and machinery. The village owns and operates the waterworks. The public library has nearly 3,000 volumes. Pop. (1900) 3,480.

Logan, Utah, city, county-seat of Cache County; on Logan River, and on the Oregon

Short Line railroad; about 70 miles north of Salt Lake City. It was settled in 1859 and incorporated in 1866. It is located in an agricultural region with valuable mineral deposits in the vicinity. The chief industrial establishments are knitting-mills, lumber-mills, a brewery, a beet-sugar factory, and flour-mills. Some of the educational institutions are the Brigham Young College, opened in 1878 under the auspices of the Latter Day Saints, New Jersey Academy, under the auspices of Presbyterians, and the State Agriculture College. The water-works are owned and operated by the city. The city government is according to the act of 1868, providing for the general government of the cities of the State. Pop. (1900) 5,451.

Logan, Mount, one of the highest peaks of the Rocky Mountain system, in the southwestern part of the district of Yukon in Canada. Its height is 19,500 feet. The report of the United States Geological Survey of 1898 ranks this peak as second in height in North America; Mount McKinley (q.v.) being first.

Logania'cea, an order of trees, shrubs and herbaceous plants, with opposite entire leaves, and usually with stipules, which adhere to the footstalks or form sheaths. A few species of this order occur in Australia and in the temperate parts of North America; the rest are all tropical or sub-tropical. No order of plants is more strongly characterized by poisonous properties. It includes the genus *Strychnos* and the plant which yields the poison curari (q.v.).

Logansport, Ind., city, county-seat of Cass County; at the junction of the Wabash and Eel rivers, and on the Wabash, the Pittsburg, C. & St. L., the Toledo & L., and the Vandalia R.R.'s; about 70 miles north of Indianapolis. It is situated in a fertile agricultural section in which the chief farm products are wheat, corn, and vegetables. It is the trade centre for a section which has a population of about 120,000. It has excellent water-power, and natural gas. The chief manufacturing establishments are car-truck and automobile factories, motor-works, basket and broom factories, flour and lumber-mills, wagon and carriage factories, lime and cement works. The railroad shops employ about 1,000 men, the Dorner Truck Foundry and the Western Motor Company employ about 300 each.

The educational institutions are Holy Angels' Academy (R. C.), Logansport Business College, a high school, public elementary schools, Roman Catholic and Lutheran parish schools. There are 17 churches, Saint Joseph's Hospital, and the Northern Indiana Hospital for the Insane. There is a farm of about 300 acres connected with the Insane Hospital. The city has a government building, a Carnegie library, county court-house, and a large number of fine residences. There are five banks with a combined capital of \$750,000. Several bridges connect the city with places across the Wabash and Eel rivers. The city owns and operates the electric-light plant and the waterworks. The government is vested in a mayor, who holds office four years, and a council of 10 members. The council elects the board of education and all the administrative officials except the police commissioners, who are appointed by the Governor

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according to a State law for municipalities. Pop. (1890) 13,328; (1900) 16,204.

A. R. KEESLING,
Editor of 'Daily Journal.'

Logarithmic Curve, in mathematics, a curve discovered by Gregory; it is the locus of a point such that its distance from a line is in a constant ratio to the logarithm of its distance from another line at right angles to the first. Its equation is $y = a^x$. The logarithmic or equiangular spiral is a curve which cuts all the lines drawn from a certain point at the same angle. Its equation is $r = a\theta$. Professor Tait has shown that when a pendulum swings in a resisting medium, or whenever a body moves in a straight line under the influence of a force which varies as the distance of the body from a fixed point, and when at the same time there is a resistance to its motion which is proportional to its velocity, the motion of the body is the same as the projection on a straight line of uniform motion in an equiangular spiral.

Log'arithms. The common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus $10^3 = 1,000$, so that the logarithm of 1,000 (usually written log. 1,000) is 3. Now $10^0 = 10$, $10^{-1} = 100$, $10^0 = 1,000$, $10^{-2} = 1,000,000$, and it is well known that $10^{-3} = 1$, $10^{-4} = 0.1$, $10^{-5} = 0.01$, etc., thus:

Log. 0.001 = -3	Log. 10 = 1
Log. 0.01 = -2	Log. 100 = 2
Log. 0.1 = -1	Log. 1,000 = 3
Log. 1 = 0	Log. 10,000 = 4

It is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2. Again, the logarithm of any number less than 1 is negative. The logarithms of numbers have been calculated by Napier, Briggs, Mercator, Newton, Leibnitz, Halley, Euler, L'Huillier, Vlacq, Sherwin, Gardner, Hutton, Taylor, Callet, and others. Of works giving tables of logarithms we may mention those to which the names of Hutton, Callet, and Vega are respectively attached. Chambers' Mathematical Tables is a useful little treatise; it gives logarithms of numbers to seven places of decimals. Suppose we wish to know the logarithm of the number 18.1. In a book of tables we only find the fractional part of the logarithm, it is .257679. Now 18.1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence log. 18.1 = 1.257679. To give examples:

Log. 18100 = 4.257679	Log. 1.81 = 0.257679
Log. 1810 = 3.257679	Log. 0.181 = 1.257679
Log. 181 = 2.257679	Log. 0.0181 = 2.257679
Log. 18.1 = 1.257679	Log. 0.00181 = 3.257679

.257679 means $-3 + 0.257679$. For a full explanation of the finding of logarithms and natural numbers by the tables see treatises on trigonometry, etc. The integral part of a logarithm is called its characteristic, the fractional part its mantissa. Logarithms make arithmetical computations more easy, for by means of a table of them the operations of multiplication, division, involution or the finding of powers, and evolution or the finding of roots, are changed to those of addition, subtraction, multiplication, and division respectively. For instance, if x and y are the logarithms of any two numbers, the numbers are 10^x and 10^y ; now the product of these

numbers is 10^{x+y} , so that the logarithm of the product of two numbers is the sum of the logarithms of the numbers. Again, the quotient of the numbers is 10^{x-y} ; so that the logarithm of the quotient of two numbers is the difference of the logarithms of the numbers. Again, 10^x raised to the n th power is 10^{nx} ; so that the logarithm of the n th power of a number is n times the logarithm of the number. Again, the n th root of 10^x is $10^{\frac{x}{n}}$; so that the logarithm of the n th root of a number is $\frac{1}{n}$ th of the logarithm of the number. Hitherto we have spoken of common logarithms, which were invented by Briggs; their base, as it is called, is 10. Now logarithms were first used by Napier of Merchiston (see NAPIER, JOHN), and he employed a base which is smaller than 10, it is the number 2.7182818..., or the sum of the infinite series $2+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\dots$, etc. This base is denoted by e in mathematical treatises, and the Napierian logarithm of any number, say 7, is $\log_e 7$, to distinguish it from $\log 7$, which is the common logarithm, whose base is 10. The common logarithm of a number is found from the Napierian by multiplying by 0.43429448. Napierian logarithms are of great importance in mathematics.

Log'cock, a local name for either of two birds: (1) the pileated woodpecker (see WOODPECKER); (2) the woodcock (q.v.).

Log'gerhead Shrike. See TURTLE.

Loggerhead Turtle. See HAWKSBILL.

Loggia, lōj'a, a word used in Italian architecture with several significations. It was applied to a hall open on two or more sides, where there were pillars to support the roof. Such are the Loggia de' Banchi in Genoa, and the Loggia de' Lanzi in Florence. It is also applied to an open colonnade along the side of a building. The name loggia is also given to the large ornamental window consisting of several parts, which is often seen in old Venetian palaces; and lastly, it is used to designate a small airy hall, usually open on all sides, constructed on the roof of an edifice. See also ARCHITECTURE.

Log'ging, a name given by lumbermen to the practice of rolling logs from whence they are cut, or drawing them on sleds or wagons, to the stream by which they are transported to the mill. In some places logs are thus moved from one point to another by means of flumes and waterways.

Logic, an art which treats of reasoning, together with the operations of the mind subsidiary to reasoning. Its chief end is to ascertain the principles on which all valid reasoning depends, and which may therefore be applied as tests of the legitimacy of every conclusion that is drawn from premises. Thus Whately defines logic as "the science and art of reasoning," and Whewell says that "by logic has generally been meant a system which teaches us to arrange our reasonings that their truth or falsehood shall be evident in their form." Hamilton defines it as "the science of the laws of thought as thought." Some logicians would extend the sphere of logic further than is consistent with any of the definitions just given, and make it coextensive with the science and theory of evidence in the most general sense of that term; but we shall be following the most general

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usage if we confine it to the study and estimation of such evidence as depends for its sufficiency more or less immediately on some admitted truth which is at least equally general in its nature with that which it is held to prove.

Divisions.—Logic has been divided, according to different principles, into objective and subjective (*Logica systematica* and *Logica habitualis*); into abstract or general and concrete or special (*Logica docens* and *Logica utens*); into pure and modified; and into deductive and inductive. The first of these divisions looks at logic, on the one hand, as a systematized body of truths on the subject of which it treats, and, on the other hand, as the knowledge of these truths which is possessed by an individual, and the ability which that individual displays in applying them. The second division, into abstract and concrete, considers logic in the first case apart from any of its particular applications, and in the second case as applied to some particular art or science. The division into pure and modified logic looks at that science first in its naked theory, and secondly as modified in its application to the search after truth by the mental constitution of man generally or particular individuals; or, in other words, pure logic treats of the laws of correct reasoning and what is connected therewith, and modified logic treats of those circumstances that are likely to lead men into error in reasoning.

Deductive Logic.—As we have already said, it is the function of logic to treat not only of reasoning, but also of the operations of the understanding subsidiary to reasoning. Reasonings come under the examination of logic only as they are expressed in words; thus only can they appear in such a form that their truth or falsehood will be instantly evident, according to the requirements of Whewell's definition of the science. As expressed in words reasonings are composed of judgments or propositions, and judgments are composed of terms, general or particular. Naming and judging are therefore two operations of the understanding, and names and propositions two mental products which, as subsidiary to reasoning, belong to the province of logic.

Laws of Thought.—But before saying anything on these subsidiary operations it is necessary to state the three axioms or fundamental laws of thought which regulate the understanding in all its operations whether of naming, judging, or reasoning, and which are in themselves self-evident. These are, 1, the law of identity; 2, the law of contradiction or difference; and 3, the law of excluded middle. The law of identity expresses the fact that everything is the same as itself: its formula is A is A. The law of contradiction or difference expresses the fact that nothing can be the same as its contradictory: its formula is A is not Not-A. The law of excluded middle expresses the fact that one or the other of two contradictory propositions must be true: It asserts the truth of the formula A is either B or not B. Applying these laws to naming then, we can affirm that every name must be the same as itself; that no name can be thought as expressing contradictory attributes; that no name, for example, is thinkable as expressing at once the attributes of rationality and irrationality; and that of every name we can assert that any attribute either is or

is not expressed by it. To these laws some writers add the law of reason and consequent, expressed by the formula, Infer nothing without a reason.

Names or Terms.—It would be impossible without extending the length of this article disproportionately to go very minutely into the theory of naming. It is enough to mention that names are applied to persons or things, either in virtue of certain attributes which they possess, or merely in order to distinguish one individual from another. The former have been aptly called connotative, because they connote (mark together) or express the attributes which constitute their meaning, and they may be applicable either to single individuals (as God, the sun), or to numbers of individuals (as man, horse). The latter are called non-connotative, and are applicable only to single individuals, or if applied to more than one individual, are not applied in virtue of any qualities that these may happen to possess in common. The attributes expressed by a name are called its connotation, and the individuals to which it is applicable its denotation. Some writers, instead of the connotation and denotation of a name, speak of the comprehension and extension of a concept, which is the sum of the qualities expressed by a name. The comprehension of a concept is thus these qualities considered in themselves, and the extension the aggregate of individuals in which these qualities are found to exist.

Judgments.—Judgments or propositions are the forms in which our beliefs are expressed in language. In them we either affirm or deny something to be true of something else. The term expressing that of which the assertion is made is called the subject; that which expresses what is denied or affirmed of the other is called the predicate. Sometimes there is a separate word or phrase to connect the subject and predicate, and to show whether the latter is affirmed or denied of the former. This is called the copula ('is' or 'is not' or 'are' or 'are not').

Distribution.—The words all, some, etc., showing whether the subject of a proposition is distributed or not, are said to indicate the *quantity* of the proposition. Sir W. Hamilton advanced the theory that in every proposition the predicate should have a sign of quantity as well as the subject, so that every proposition should be a perfect equation. This is what is called the doctrine of the quantification of the predicate, but it has not been generally received into the expositions of deductive logic, and has been positively objected to by some logicians as involving a misrepresentation of the nature of a proposition. Propositions the subject of which is distributed are called *universal* or *singular*, according as the subject is applicable to more than one or to only one individual; those of which it is undistributed, *particular*. When there is no sign to indicate whether the subject is distributed or not, the proposition is called *indefinite*, in place of which Sir William Hamilton introduced the term *predesignate*, applying the term *predesignate* to those in which the quantity was overtly expressed.

Quality.—As judgments are said to differ in quantity according to the distribution or non-distribution of their subject, so they are said to differ in *quality* according as they are affirmative or negative; and with reference to both

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quality and quantity they are divided into four classes—universal (or singular) affirmative, represented by the vowel A; universal negative, represented by E; particular affirmative, represented by I; and particular negative, represented by O. Examples of the four are: All men are liable to err; No man is the exact counterpart of another; Some men are wise; Some men are not wise.

Conditional Judgments.—Hitherto we have only treated of what are called categorical propositions, that is, those in which something is directly affirmed or denied of the subject; but there is another class in which the predication is not direct. Of such propositions there are three kinds, hypothetical, disjunctive, and hypothetico-disjunctive or dilemmatic. *Hypothetical* propositions are such as have a condition attached to the predicate, as, If A is B, C is D, or if A is B, it is C. The condition is called the *antecedent*, and the proposition whose truth depends upon the condition is called the *consequent*. *Disjunctive* propositions are such as in effect, though not in form, affirm the truth of one of two or more propositions, such as, Either A is B, or C is D, or again, A is either B or C or D, the first of which is equivalent to, One of the two propositions A is B, C is D is true; and the second to, One of the propositions, A is B, A is C, A is D, is true. Such propositions are often treated by logicians as if the alternative excluded the possibility of more than one of the propositions being true. The first of the examples given would, according to this rule, be considered as equivalent to, One, and only one, of the propositions A is B, C is D is true; and the second, One, and only one, of the propositions A is B, A is C, A is D is true. But this is quite an uncalled for limitation of the meaning of the phrase disjunctive proposition, and leaves one form of proposition without a name; for judgments in which we assert that at least one of two or more alternatives is true, are often made without the intention of excluding the possibility of more than one being true. It might be said, for example, of a man who had expended great sums of money in projects of questionable utility, that he must either be very wealthy or very foolish, without meaning to state that he could not be both very wealthy and very foolish. Indeed, it would be more proper to regard the latter sense as the true meaning of a disjunctive proposition, inasmuch as that expresses all that is necessarily implied in a proposition of that form. The last kind of indirect proposition, the *hypothetico-disjunctive* or *dilemmatic* is a compound of both the other two, in some such form as, If A is B, C is either D or E. As a hypothetical proposition affirms (or denies) some predicate of some subject conditionally, a hypothetico-disjunctive proposition affirms (or denies) the truth of one or other of two or more propositions conditionally.

Immediate Inference.—Before we pass from judgments to reasonings, or the doctrine of syllogisms, we have to consider four methods of treating propositions, so as to derive other propositions, the truth or falsity of which is implied in the original propositions. These methods are called processes of immediate inference.

1. Contraposition.—The first of these processes is called *contraposition*. Thus, the prop-

osition, All men are mortal, becomes by contraposition, No man is immortal.

2. Subalternation.—The second process is through the relation of *subalternation*. This relation subsists between universal propositions, whether affirmative or negative, and their corresponding particulars, or between A and I, and between E and O, when the terms of the propositions are otherwise the same. A and E are called *subalternants* with reference to I and O respectively, and I and O are called with reference to them *subalternates*.

3. Opposition.—The third process of immediate inference is of somewhat more importance. It depends upon the doctrine of *opposition*. The laws of immediate inference bearing upon propositions standing to one another in the relation of opposition are the following: 1. Of two contradictory propositions one must be true, and the other false. If it is true that All A's are B, it must be false that Some A's are not B; if it is false that Some A's are B, it must be true that No A is B. 2. Two contrary propositions may both be false, but they cannot both be true. If it is false that All A's are B, it may nevertheless be equally false that No A is B; but if it is true that All A's are B, it must be false that No A is B; and if it is true that No A is B, it must be false that All A's are B. 3. Two sub-contrary proposition may both be true, but they cannot both be false. If it is true that Some A's are B, it may be none the less true that Some A's are not B; but if it is false that Some A's are B, it cannot be false that Some A's are not B.

4. Conversion.—The last process of immediate inference is also important, especially on account of the part it plays in the theory of the syllogism as usually expounded. In every kind of conversion the proposition in its original form is called the *convertend*, and the proposition into which it is changed the *conversa* or *conversc*. The law of conversion is that no term must be distributed in the converse which was not distributed in the convertend. Thus the converse of All A=B is, All B=A. No A=B by conversion becomes No B=A, Some A=B is converted into Some B=A, etc.

Ratiocination.—We now come to that which forms the main subject of deductive logic, the theory of ratiocination, or the syllogism. All deductive reasonings, or reasonings from generals to particulars, must necessarily be capable of being stated in the form of a syllogism, and on being so stated their validity will be evident from their form. A *syllogism* consists of three propositions, two of which, called collectively the *antecedent*, and separately the *premises*, state the grounds of the inference deduced; while the third, called the *consequent* or *conclusion*, states what that inference is. Every syllogism consists of three terms, each of which occurs twice. Of these one occurs twice in the antecedent, once in each premise, and is called the *middle term*. The other two occur once in the antecedent, and once in the consequent. That which is the subject of the consequent is called the *minor term*, and that which is the predicate the *major term*. Both together are sometimes called the *extremes*. The premise containing the major term is called the *major premise* (by Sir W. Hamilton the *sumption*). That containing the minor term is called the *minor premise* (by Sir

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W. Hamilton the *subsumption*). It is a matter of no consequence to the validity of a syllogism in what order the propositions are given; but in logical treatises the usual order is 1st, major premise, 2d, minor premise, 3d, conclusion; and all logical formulas referring to the syllogism are based on the assumption that its parts are so stated.

Figure.—The syllogism may appear in four different forms, called *figures*, according to the position of the middle term, which may be subject in the major premise and predicate in the minor, predicate in both premises, subject in both premises, or predicate in major and subject in minor. These figures are known as first, second, third, and fourth, and are usually represented by the following scheme, in which P (predicate of conclusion) stands for the major term, S (subject of conclusion) for the minor, and M for the middle:

	Fig. 1	Fig. 2	Fig. 3	Fig. 4
Major premise	M P	P M	M P	P M
Minor premise	S M	S M	M S	M S
Conclusion.....	S P	S P	S P	S P

The Ground of Validity of Syllogistic Reasoning.—Logicians commonly base the validity of the syllogistic process upon some form of the canon, called the *Dictum de omni et nullo*, which in its Latin form reads thus—*Quicquid de omni valet, valet etiam de quibusdam et singulis; quicquid de nullo valet, valet nec de quibusdam nec de singulis;* which may be interpreted in English thus: “Whatever is true of a whole class, is true of what is included in that class.”

Mood: Syllogistic Rules.—We have already seen that what determines the figure of a syllogism is the position of the middle term. Another division of syllogisms is determined by the quantity and quality of the propositions of which they are composed. If the four propositions A E I O be taken three together in different order there will be sixty-four sets, and if all these sets made legitimate syllogisms there would be sixty-four moods irrespective of figure. But if we test these sets by rules deduced from the syllogistic canon, we shall find that the great majority of them cannot make legitimate syllogisms. These rules are six in number: 1. In every syllogism there must be three, and only three terms. If this rule were overtly violated the pretended reasoning would not even have the form of a syllogism. 2. The middle term must be distributed in one of the premises. 3. Neither the minor term nor the major must be distributed in the conclusion, if it was undistributed in the premises. The first part of this rule implies that if one of the premises is particular the conclusion must be particular; and the second part of the rule, taken in conjunction with the second rule, implies that from two particular premises no conclusion can be drawn. 4. If both premises are affirmative, the conclusion must be affirmative. 5. If either of the premises is negative, the conclusion must be negative. 6. From two negative premises no conclusion can be drawn.

Let us now apply these rules to ascertain the number of logical moods. Two of them, the sixth and the corollary deduced from the second and third, apply to the premises exclusively, in such a manner as to serve as tests of the possibility of the various pairs of propositions

entering into legitimate syllogisms as premises. The number of different pairs of propositions taken in different order is sixteen. They are AA, AE, AI, AO, EA, EE, EI, EO, IA, IE, II, IO, OA, OE, OI, OO. Three of these, II, IO, and OI, are excluded by the corollary to the second and third rules affirming that from two particular premises no conclusion can be drawn; three, EE, EO, and OE, are excluded by the sixth rule forbidding two negative premises; and one, OO, is excluded by both. If we closely examine the pair IE we shall find that it also must be excluded, for it follows from the first corollary to the third rule, and from the fifth rule, that any conclusion derived from these premises must be both particular and negative, that is O. But in such a conclusion the predicate would be distributed, whereas it could not have been distributed in the major premise I, as both terms of it are particular. A syllogism with the premises IE must therefore be a violation of the third rule. There thus remain only eight pairs of premises capable of entering into a valid syllogism, namely AA, AE, AI, AO, EA, EI, IA, and OA. Three of these being universal both in the major and minor, AA, AE, and EA, may give either universal or particular conclusions. The conclusion of the others must be particular. There are thus eleven different sequences of propositions which yield valid syllogisms, AAA, AAI, AEE, AEO, EAE, EAO, AII, AOO, EIO, IAI, and OAO, and if all these could occur in each of the figures there would be forty-four syllogistic moods; but this number is limited by the special rules applicable to the different figures and we must state these rules before we can see what are the valid moods for each.

The rules for the First Figure are three: 1. The minor premise must be affirmative. 2. The major premise must be universal. 3. The quality of the major premise determines the quality of the conclusion, and the quantity of the minor the quantity of the conclusion.

We will again demonstrate one of these rules, say the second, for the sake of illustration. It will be remembered that the formula of the first figure is MP, SM, SP. Now if the major premise is not universal, its subject, the middle term, is not distributed; and as the minor premise by the first of our special rules must be affirmative, its predicate, also the middle term, cannot be distributed. The middle term is thus distributed in neither case, and the second general rule is violated. If we apply our special rules then to the eleven model forms we shall find that only four of them, AAA, EAE, AII, and EIO, can be exhibited in the first figure. The two, AAI and EAO, would also yield legitimate syllogisms, but as they infer a particular conclusion when a universal one, in accordance with the rule that the quantity of the minor premise determines that of the conclusion, is warranted, they are not used; and the same applies to two cases in the second and one in the fourth figure.

The rules for the Second Figure are also three: 1. One of the premises must be negative. 2. The conclusion must be negative. 3. The major premise must be universal.

Applying these rules to our eleven model forms we again obtain four valid moods, AEE, EAE, AOO, EIO. AEO and EAO are the two which are rejected as yielding a particular conclusion when a universal one is warranted.

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The rules for the Third Figure are two: 1. The minor premise must be affirmative. 2. The conclusion must be particular.

These two rules admit of six valid moods, namely, AAI, EAO, AII, EIO, IAI, and OAO.

The rules for the Fourth Figure have been variously stated, but the three following may be given as the most comprehensive of those that have been devised for it: 1. If the major premise is affirmative the minor premise must be universal. 2. If one premise is negative the major premise must be universal. 3. If the minor premise is affirmative the conclusion must be particular.

These special rules yield the five moods, AAI, AEE, EAO, EIO, and IAI. AEO is rejected on account of its having a particular conclusion when a universal one is warranted.

We now see that there are in all nineteen syllogistic moods, and in one or other of these every categorical deductive reasoning must be expressed before its validity can be tested. The difficulty of retaining these moods in the memory has led various logicians to embody them in mnemonic lines. The most ingenious are those invented in barbaric Latin for the first three figures by Petrus Hispanus, who filled the papal chair with the title of Pope John XX. or XXI. in 1276-7. These lines not only represent by the ordinary vowels the syllogistic moods, but in the second and third figures also indicate by certain consonants the method by which they are to be reduced to syllogisms of the first figure. The mnemonics for the fourth figure are wanting in the lines of Hispanus, because that figure was not recognized by the earliest logicians (as it is still indeed condemned by many on account of its awkward and irregular mode of inference), but they were afterward added in a new line. In their complete form these mnemonics stand thus:—

I. bArBArA, cElArEnt, primæ, dArII,
fErIOque:
II. cEsArE, cAmEstrEs, fEstInO, bArOcO,
secundæ:
III. tertia dArAptI, dIsAmIs, dAtIsI,
fElApOn,
fErIsO, bOcArD O, habet: quarta insuper
addit

IV. brAmAntIp, cAmEnEs, dImArIs, fEs-
ApO, rEsIsOn.

The vowels printed in capitals, it will be seen, show the moods of each figure; and for the consonants, the initial one shows that the syllogisms in the three last figures must be reduced to the one beginning with the same consonant in the first; *s* indicates that the previous proposition must be simply converted; *p* that it must be converted *per accidens*, that is, the quantity of the proposition must be changed; *m* that the premises may be transposed (*metathesis* or *mutatio*); and *r* following a vowel indicates that the process to be resorted to is that called *reductio ad impossibile*.

Fallacies.—A section on fallacies or invalid reasonings forms the usual supplement to an exposition of the theory of deductive logic. As a complete statement of the principles of ratiocination must contain tests of the validity of all valid deductive reasonings, every fallacy or invalid reasoning must consist in a violation of one or other of these principles, that is, in a violation of some one or more of the six general laws applicable to the categorical syllogism or of the

rules given for regulating the modes of inference in conditional syllogisms. A violation of the first law of the syllogism, that which requires that there shall be only three terms in it, can happen in such a manner as to leave the form of a true syllogism, only when the same middle term is used in different senses in the two premises, that is, when the middle term is ambiguous in meaning—a very common source of fallacy. The violation of the second rule as to the distribution of the middle term in one of the premises is called the fallacy of *Undistributed Middle*. The violation of the third, which says that no term must be distributed in the conclusion if it was not distributed in the premises, is called an *Illicit Process*. If it is the minor term in which the fallacy arises it is called the *Illicit Process of the Minor*; if it is the major term, the fallacy is called the *Illicit Process of the Major*. The fallacies of undistributed middle and illicit process are called *Fallacies of Quantity*, violations of the remaining syllogistic laws (4th, 5th, and 6th) are called *Fallacies of Quality*. For these there are no special names, nor for the violations of the laws relating to conditional syllogisms. These are all the fallacies belonging to the form of ratiocination, which is all that deductive logic has properly anything to do with. See **FALLACY**.

INDUCTIVE LOGIC. Definition of Induction.—Having thus completed our summary of the received exposition of deductive logic we now pass to the other section of the science, to which the name of Inductive Logic is given; and in treating of it we will confine ourselves to the views of J. S. Mill, the writer whom we have already mentioned as the most systematic expositor of that part of logical science. Induction is shortly defined by him as "generalization from experience." At another place he states more minutely that "it consists in inferring from some individual instances in which a phenomenon is observed to occur, that it occurs in all instances of a certain class; namely, in all which resemble the former, in what are regarded as the material circumstances." Again, Induction is, "without doubt, a process of real inference. The conclusion in an induction embraces more than is contained in the premises. . . . A principle ascertained by experience is more than a mere summing up of what has been specifically observed in the individual cases which have been examined: it is a generalization grounded on those cases, and expressive of our belief that what we there found true is true in an indefinite number of cases which we have not examined, and are never likely to examine."

Inductive Canons.—We may now proceed at once to state the rules which Mill gives for generalizing from experience, the rules to which he gives the name of *Inductive Canons*.

I. The first he calls the Method of Agreement, which he enunciates thus: "If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon." He gives the following as the axiom upon which it depends: "Whatever circumstance can be excluded without prejudice to the phenomenon, or can be absent notwithstanding its presence, is not connected with it in the way of causation. The casual circumstances being thus eliminated, if only one remains, that one is the

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cause which we are in search of: if more than one, they either are, or contain among them, the cause." The canon is exhibited in the formula $ABC, abc; ADE, ade; AFG, afg$; where a may be taken to represent the phenomenon under investigation, and A therefore, in accordance with the canon just stated, will be the cause of a , as it is the only circumstance in which all the cases in which a occurs agree. To illustrate these canons by concrete examples in such a manner as to give anything like a satisfactory idea of their application in scientific inquiry would occupy far too much of our space, and we must therefore refer the reader who is desirous of seeing this done to Mill's own work (*System of Logic*, Book III. ch. ix.). We may, nevertheless, mention as a trifling example of this method, that it is by it that we know that every plant reproduces its own kind. Our knowledge of this fact is an inference from the uniform observation that all plants of a particular species agree in having proceeded from some member of that species, whether by seed, bud, slip, or any other means. This method is of very wide application, but it must be mentioned that it labors under two defects, one of which even invalidates its theoretic accuracy. The first defect consists merely in the difficulty of having the conditions of the method fully satisfied, that is, the difficulty of ascertaining that the cases investigated do agree only in one particular. The other defect arises from the plurality of causes, or from the fact to which attention has already been drawn, that different causes may produce the same effect. This circumstance renders the axiom on which the canon is said to depend false, for although a circumstance which was present, in which a phenomenon occurred, may be absent in another case, in which the same phenomenon occurs, this does not prove that the circumstance in question did not in the first instance produce the phenomenon. It may have been the cause in one case, and something else in another.

II. The second canon is called the Method of Difference, and according to Mill depends on the axioms, "Whatever antecedent cannot be excluded without preventing the phenomenon is the cause, or a condition, of that phenomenon. Whatever consequent can be excluded, with no other difference in the antecedents than the absence of a particular one, is the effect of that one." The canon itself is this: "If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or the cause, or a necessary part of the cause of the phenomenon." The formula of the canon (the same notation being used) is $ABC, abc : BC, bc$. A must be the cause of a . This is by far the most important of the inductive canons, both on account of the extent of its application, and also from its being free to a great extent from the practical difficulties besetting the application of the first method, and altogether free from objection as to its theoretical validity. If the only things that could have produced a are ABC , and BC alone are not sufficient to produce it, it follows inevitably that A is at least an indispensable part of its cause. Examples of inference in accordance with this canon are constantly occurring. We

may find at least two in the illustration we have already used of the ball on a level surface acted upon by an outward force. It is by the method of difference we know that the motion of the ball across the surface is due to the impact of the other solid body, for before that impact the ball was stationary, but immediately after it began to move, although (as we have supposed) no other change took place in the circumstances. It is also by the method of difference that we know that in the second instance, when the ball was placed upon a rough surface, and acted upon by the same force as in the first, its stopping before it reached the point it had reached in the first instance is due to the roughness of the surface, for that is the only circumstance in which the cases differ.

III. The third of Mill's canons of inductive logic is an attempt to combine the first two, with the object of helping to remove the uncertainty which belongs to the first. It is called the Indirect Method of Difference, or the Joint Method of Agreement and Difference, and is stated thus: "If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect, or cause, or a necessary part of the cause of the phenomenon." Its formula is $ABC, abc; ADE, ade; AFG, afg : HBC, hbc; IDE, ide; KFG, kfg$. We may again return to our illustration from vegetable reproduction for an example of this method. If, besides examining the cases in which plants of a certain species are produced, we examine those in which they are not produced, but, we will suppose, some other plants closely resembling them are produced, and find that the circumstances attending the production of these latter differ from those attending the production of the former only in respect of the origin of the seed, bud, slip, or whatever else it may be from which they respectively proceeded, we shall have a case of the joint method of agreement and difference; and our conclusion in the former case will be greatly strengthened. This method is, however, no more theoretically rigorous than the first, for even although we exhaust in the negative set of instances all the antecedents that were found in the positive set except one, yet we can never be sure that that one is the cause as long as the negative instances, besides excluding the one that was found constant in the positive set, include some new circumstance or circumstances besides those that were found in combination with A in the positive set, for these new circumstances may have been the very causes why the phenomenon under investigation did not occur. In ABC, abc , B may have been the cause of a , and in HBC, hbc , H may have been the circumstance that counteracted the operation of B , so that a did not appear: in ADE, ade , D may have been the cause of a , and may have been counteracted in IDE, ide , by I .

IV. The fourth inductive canon is called the Method of Residues, and, like the method of difference, is based upon the principle of a complete elimination of all circumstances not connected by way of causation with the phenomenon under investigation. It is this: "Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain

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antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.' It is by an application of this method that when we know the weight of a vessel and its contents, and also the weight of the vessel alone, we can infer the weight of its contents. This is manifestly equally rigorous in its principle with the method of difference.

V. The last inductive canon is applicable to those cases in which we cannot obtain a case of the method of difference, owing to the impossibility of removing the phenomenon under investigation. Thus we cannot entirely remove heat from a body, and therefore cannot observe the effect of heat by examining some body first without and then with heat. We cannot remove the sun from the solar system, and therefore cannot tell by actual experiment what effect its absence would have. In these circumstances we resort to the Method of Concomitant Variations, which depends on the axiom, "Anything on whose modifications modifications of an effect are invariably consequent must be the cause (or connected with the cause) of that effect." The canon itself is enunciated thus: "Whatever phenomenon varies in any manner whenever another varies in some particular manner is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation." Although we have no opportunity of observing any body absolutely deprived of heat, we can observe the same body at different temperatures. It is in this way that we discover that heat has the effect of expanding bodies, for with no other change than an increase of temperature we see that mercury expands.

Consult Whately's 'Logic'; some articles on the subject in Sir W. Hamilton's 'Discussions' (second edition, 1853); 'Lectures on Logic' by the same author (1860); Thomson's 'Outlines of the Laws of Thought'; Ueberweg's 'System der Logik und Geschichte der Logischen Lehren' (5th ed., 1882); De Morgan's 'Formal Logic' (in which mathematical principles are applied); Boole's 'Mathematical Analysis of Logic'; Keynes's 'Formal Logic' (1884); Bosanquet's 'Logic' (1888); Sigwart's 'Logik' (2d ed., 1889); Wundt's 'Logik' (2d ed., 1893); Erdmann's 'Logik' (1892); Lotze's 'Grundzüge der Logik'; and Minto's 'Logic' (1893). On inductive logic see Sir John Herschel's 'Preliminary Discourse on the Study of Natural Philosophy' (London, 1831); Whewell's 'Philosophy of the Inductive Sciences' (1840); and especially Mill's 'System of Logic' (1843).

Logoma'nia (Greek *λόγος*, word; *μανία*, madness), violent disturbance of speech; utter confusion of words, often with great loquacity, and with dissociation of language and ideas; the extreme type of aphasia (q.v.).

Log'o's (Greek *λόγος*, from *λέγειν*, to speak), word, language, speech in general. Language being peculiar to man as a reasonable being, and speech presupposing thought, *logos* signifies reason, the faculty of thinking in general. Thus *logos* has the meaning both of thought and utterance. In Christian theology this term as used in certain passages of the Scriptures, has been the source of continual disputes ever since the 3d century of our era. The passage in the Bible which gives rise to this discussion is the opening of the Gospel of St. John: "In the beginning was the Word, and the Word was with

God, and the Word was God. The same was in the beginning with God. All things were made by him, and without him was not anything made that was made," etc. In the Greek text the expression here translated "Word" is *logos*. What is here to be understood by *logos*, what is its essential character, whether it is a person of the Deity or not, the creative intellect of God, or the Son, through whom he created, or the divine truth which was to be revealed, etc., this is not the proper place to examine, nor will our limits permit us even to enumerate the different opinions which have been entertained on this interesting point of Christian metaphysics. We can refer the reader to no better source of information than Neander's 'General History of Christianity and the Church.' The generally received doctrine of the *logos* makes it a person and not a mere name, and maintains that the Word is called *God*, not by catachresis, but in the strict and rigorous meaning of the term; that the most ancient Fathers of the Church always taught the divinity of the Word, and that they derived the idea from the Holy Scriptures alone, and not from the Platonic philosophy as many have asserted. On the contrary, it is held that the Hebrew conception of the *logos* is of independent origin, though it was natural that in the New Testament the Greek word should be adopted to express it. Some of the opinions of modern theologians on the meaning of the *logos* are as follows: It is necessary, some say, in order to understand the true meaning of *logos*, to begin with the examination of Wisdom (*sophia*), which was previously used to express the same notion (See the Book of Proverbs, viii. 1, seqq., and the book of Wisdom, vii. 22, seqq.). The poetical author of the Proverbs does not imagine a person separate from God, but only an interior power of God, because, in his time there could be no idea of being proceeding from God, the Jews having borrowed this notion at a later period from the oriental doctrine of emanations. The author of the book of Sirach (xxiv. 3) first uses "The Word" (*logos*) of God as equivalent to "Wisdom" (*sophia*), to signify the almighty power of God. The Word being an act of wisdom gave rise to the symbol John speaks of the *logos* in the beginning of his Gospel only, and afterward uses the expression *pneuma tou theou*. From his representation, the following positions have been deduced: the *logos* was (a) from the beginning of all things (comp. Proverbs viii. 22; Sirach xxiv. 9); (b) from the beginning with God (comp. Sir. i. 1; Wisd. Sol. x. 16; ii. 14; Sir xxiv. 12). St. John, therefore, says those who thus interpret him, had the same idea of the *logos* as the apocryphal writers; for the circumstance that the latter ascribe to the *logos* the creation of all things, while St. John leaves this point undecided in his *en archē ēn* (in the beginning was) does not amount to a contradiction. Others, particularly the earlier commentators, understand by *logos* the Deity himself, that is, the second person of the Deity (according to St. John viii. 58). But those who adhere to the former opinion maintain that this is in contradiction to John xiv. 28; xii. 49, 50; v. 19, 20; and that he understood by *logos* only a power of God, which was communicated to Jesus, on account of which he could claim divine attributes and yet call the Father, as the source of this power, greater than himself. Others, as Herder,

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Paulus, Eckermann, understand by *logos* the Word of God, which, in the Old Testament, as the expression of the will of God, is the symbol of his creative power (Gen. i., et seq.). The later Jews represented the divine omnipotence by the Word of God. But it is maintained, on the other hand, from the manner in which John speaks of the *logos*, that he understood by it not merely omnipotence, but the Omnipotent. Others following the Fathers of the Church, particularly Eusebius, understand by *logos* an independent substance, external from God, like the *nous* (intellect) of Plato. But this again, it is said, involves an error, because Plato means by *nous* only a power of God. Still others, as Mosheim, Schlegel, Jerusalem, declare with Irenaeus the *logos* of St. John to be identical with the *logos* of the Gnostics; but it is objected that John did not conceive of a plurality like that in the doctrine of aeons. Lange considered *logos* equivalent to the *sophia* of the Old Testament, and that to the *logos* of Philo, and as a distinct person from God; but, say the others, *sophia* is not something distinct from God. Paulus, in his Commentary, also identifies the *logos* of Philo with that of St. John. But it is said, on the other hand, that John cannot be supposed to have been acquainted with Philo's notion, as it was not an opinion current at the time, and that the view of the apocryphal writers is more in harmony with his; moreover, that if St. John means anything more than an original, external power in God, his "was God" (St. John i. 1) would imply dualism. Doderlein and Storr translated the word *logos* by *doctrina*, the abstract being put for the concrete, *doctrine* for *teacher*, as in Gen. xlii. 38; 2 Sam. xxii. 23; Luke iv. 36. According to others, *ho logos* means *ho legomenos* (the promised). The ancient philosophers often distinguish two *logoi*, an interior in God or man which merely thinks (*logos endiathetos*), and an exterior or uttered (*logos prophorikos*).

Log'wood, the heart-wood of the *Hæmatoxylon Campechianum*, a leguminous tree which grows wild, in moist places, along the eastern shores of Mexico and Central America. From its abundance in some parts near the Bay of Campeachy it is sometimes called *Campeachy-wood*. The leaves are pinnate; the flowers small, yellowish, and disposed in axillary racemes at the extremity of the usually spinous branches. The wood is red, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a good polish; and it yields an extract much used in dyeing. (See DYES.) Though cultivated to some extent in Jamaica, the logwood of commerce is chiefly obtained from Honduras, where the cutting of it forms an extensive but unhealthy branch of business. Haiti and San Domingo also produce much. The finest kind comes from Campeachy, the inferior qualities from Honduras and Jamaica, to which island it is not indigenous, but where it grows abundantly since its introduction. In the preparation of this wood for use, the trees, which are from 20 to 50 feet high, are cut down, the bark and alburnum removed, and the hard centre parts cut up into 3-foot-long logs. It is afterward hewn into much smaller pieces, and ground or rasped to small chips. The aqueous extract is muddy and of a reddish-brown color. By acids the red

color is made paler; by alkalies it is converted to purple. Salts of iron, aluminum, and lead give precipitates of a blue, violet, or purple color. Logwood is chiefly consumed in dyeing cotton cloth, silk, wool, and leather; by mordanting the fabric with iron, black is produced; with alumina, violet and lilac; with copper, blue; and with chromium, a black or green—the exact tint depending on the composition of the mordants and logwood liquors, and the mode of application. The coloring power of logwood depends chiefly on a crystalline ingredient called *hæmatoxylin* (q.v.). In medicine both the extract and the decoction of logwood are used to some extent. The former is prepared by exhausting the wood with boiling water, filtering, and evaporating to a thickish syrup; the latter is the watery extract of the wood along with some cinnamon. Both are used as astringents in diarrhoea and dysentery.

Lohengrin, lō'ēn-grēn, the hero of an old German poem, written in the end of the 13th century. Ruckert's edition (1857) of the poem is the best. The poem is a continuation of Wolfram von Eschenbach's 'Parzival.' Wagner made it the subject of his great opera, 'Lohengrin' (1848).

Loir, lwar, France, a northwestern river which rises in the lagoon of Cernay in the Eure-et-Loir department, traverses the departments of Loir-et-Cher and Sarthe, and after a partly navigable course of 180 miles, flows into the Sarthe, five miles above Angers.

Loire, lwar (anc. *Liger*) France, the largest river of the country, dividing it into two nearly equal portions. It rises on the western slope of the Cévennes, in the department of Ardèche, and flows generally northwest and west to its outlet in the Bay of Biscay below Nantes. Its principal affluents on the right are the Arroux, Nièvre, Maine, etc.; on the left the Allier, Vienne, Cher, Indre, etc. Below Nantes, it is more a tidal estuary than a river, and is studded with islets. Above Nantes navigation is much impeded by shallows. Its whole course is about 645 miles, of which about 450 miles are navigable. The river is subject to disastrous inundations, and dikes (levées) have been constructed along its course. It is connected by canals with the Saône, Seine, and Vilaine.

Loja, lō'hä, Ecuador, city, capital of the province of Loja, in the southwestern part of the republic; about 50 miles from the Pacific. Its altitude is nearly 7,000 feet. It was founded in 1546. The beautiful scenery and mild climate make it a desirable residential city. It has some manufacturing. It is the seat of a college, and has a number of excellent secondary and elementary schools. Pop. 10,000.

Lokao, a dye, originally imported from China under the name of Chinese green, but now extracted from the berries of the common buckthorn. It contains 30 per cent of mineral matter. Pure lokao, obtained by treating the crude dye with solution of ammonia carbonate, filtering, and precipitating with alcohol, is a compound of ammonia with a pure blue coloring matter called lokain. An aqueous solution of crude lokao dyes cotton a pale green, but gives to wool and silk a pale bluish-gray.

Loki, lō'kē, in mythology, the god of strife and spirit of evil. He artfully contrived the

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death of Balder, when Odin had forbidden everything that springs "from fire, air, earth, and water" to injure him. The mistletoe not being included, was made into an arrow, given to the blind Höder, and shot at random; but it struck the beautiful Balder and killed him. This evil being was subsequently chained with 10 chains, and will so continue till the twilight of the gods appears, when he will break his bonds; then will the heavens disappear, the earth be swallowed up by the sea, fire shall consume the elements, and even Odin, with all his kindred deities, shall perish.

Lokman, lök-män', a name that figures in the proverbs and traditions of the Arabians. According to tradition Lokman was a scion from the stock of Ad, and was once sent with a caravan from Ethiopia to Mecca to pray for rain in a time of great drought. But God's anger destroyed the whole family of Ad except Lokman, the only righteous one, whereupon the Creator of the world gave him his choice to live as long as the dung of seven gazelles, which lay in an inaccessible hole in a mountain, should last, or for a period equal to the lives of seven successive vultures. Lokman chose the last, and lived for an almost incalculable length of time. The fables bearing the name of Lokman were for the first time made known to Europe through the press in 1615. They were first published in Arabic, with a Latin translation, were afterward appended to an Arabic grammar, published by Erpenius at Leyden, and have since gone through many editions. The most complete manuscript of the fables of Lokman is in the library of the Vatican, in Persian.

Lola Montez. See MONTEZ, LOLA.

Lolach. See LEPIDOSIREN.

Lollardism, löl'är-dizm, in Great Britain, the tenets of the followers of John Wyclif. The views of Wyclif underwent a process of development as his researches and experience extended, and were by no means the same at all periods of his life. In so far as they departed from Roman Catholicism, they approached and, in some cases, went beyond what subsequently became the doctrine and discipline of Calvinism or Puritanism, commingled with an antagonistic element, Erastianism. Among the articles pronounced "heretical" by an assembly of ecclesiastical notables, convened in London in 1382 by Wm. Courtnay, archbishop of Canterbury, were these:

" 1. That the substance of material bread and wine doth remain in the Sacrament of the Altar after consecration.

" 3. That Christ is not in the Sacrament of the Altar truly and really in His proper corporeal person.

" 5. That if a man be only contrite, all exterior confession is to him superfluous and invalid.

" 7. That it hath no foundation in the Gospel that Christ did ordain the mass.

" 8. That if the Pope be a reprobate and an evil man, and consequently a member of the devil, he hath no power over the faithful of Christ given to him by any, unless, peradventure, it be given him by the emperor.

" 9. That after Urban VI. none other is to be received as Pope, but that Christendom ought to live after the manner of the Greeks under its own laws.

" 10. That it is against the sacred Scriptures that ecclesiastical persons should have any temporal position."

Among 14 articles adjudged to be "erroneous" were the following:

" 13. That a prelate or bishop excommunicating a cleric who hath appealed to the king or the council of

the realm, in doing so is a traitor to the king and the realm.

" 15. That it is lawful for any deacon or presbyter to preach the Word of God, without the authority or license of the Apostolic See, or of a Catholic bishop or of any other recognized authority.

" 17. Also that temporal lords may at will take away their temporal goods from churches habitually delinquent.

" 18. That tithes are pure alms, and that parishioners may for the offenses of their curates detain them, and bestow them on others at pleasure, and that tenants may correct delinquent landlords at will.

" 24. That friars are bound to get their living by the labor of their hands, and not by begging.

See also DOLLARDS.

Lollards, löl'ardz, a name which arose in the Netherlands in the 14th century, and which during that and the following century was applied somewhat indiscriminately as a term of contempt to various sects or fraternities deemed heretical by the Roman Catholic Church. Different accounts are given of the derivation of the name. According to one opinion the name was first applied to a fraternity formed about the year 1300 at Antwerp, the members of which devoted themselves to the care of the sick and the burial of the dead, and were called Lollards from the Low German *lollen* or *lullen*, meaning to sing in a low tone, from the subdued and plaintive dirges that they were in the practice of singing while accompanying dead bodies to the grave. According to another opinion the name was first bestowed upon the followers of one Walter Lollard, who preached peculiar doctrines both in England and on the Continent between 1315 and 1322, till in the latter year he was burned as a heretic. Whatever may have been the origin of the name, it became well known in England about the end of the 14th century, when it was applied to the followers of Wyclif. See LOLLARDISM.

Lolos, löl'öz, an aboriginal fair-complexioned people of China, inhabiting the Ta-liang-shan mountainous country, lying between the Yangtse River on the east and the Kien ch'ang valley on the southwest in Sze-chuen, and also found scattered on the Burmese and Tibetan frontiers. They are divided into tribes governed by hereditary chieftains, and maintain an independent position, frequently warring on their peaceful Chinese neighbors, and making slaves of them. They are descendants of aborigines who were driven southward by the immigration and increase of the Chinese.

Lormami, lō-mä'mē, Kongo Free State, a navigable river of Central Africa which rises near Kazaidi (Msoa), and after flowing almost parallel with the upper course of the Kongo River, enters the latter at Isangui several miles below Stanley Falls.

Lom'ax, Lindsay Lunsford, American soldier: b. Newport, R. I., 4 Nov. 1835. He was graduated from the United States Military Academy in 1856, entered the 2d cavalry, but later resigned from the United States army, became a captain in the Virginia State troops, and 29 April 1861 was made captain in the army of the Confederate States and assistant adjutant-general to General J. E. Johnston. In February 1863 he was appointed colonel of the 11th Virginia cavalry, in July 1863 brigadier-general, and in August 1864 major-general. He commanded a brigade under Fitzhugh Lee, a division under Early, and 1865 was made commander of the valley district. He took part in

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all the battles in which his portion of the Army of Northern Virginia fought, and surrendered with Johnston at Greensboro, N. C. After the War he was employed in the war records office at Washington, D. C.

Lombard, lōm'bārd, Peter, also known under his Latinized name, PETRUS LOMBARDUS, Italian theologian: b. Lugelugno, near Novara, Lombardy, about 1100; d. Paris 20 July 1164. He was a scholar of Abelard, and traditionally the first doctor of the University of Paris. He then became a teacher of theology, and in 1150, bishop of Paris. In his 'Sententiarum Libri Quatuor,' which became the subject of almost countless commentaries, and until the Reformation had almost classical authority among theologians, he placed the opinions of the Fathers, particularly Augustine, in regard to doctrines under certain titles, and then stated the objections made to them and the answers given by church authorities, but without offering any judgment of his own. The name of his work has given him the surname of Master of Sentences. Consult 'Life' by Protois (1881).

Lombard Architecture. See ARCHITECTURE.

Lombard College, a coeducational institution founded, in 1851, in Galesburg, Ill., under the auspices of the Universalists. In 1903 there were connected with the school 24 instructors and 204 students. The library contains about 8,000 volumes. It has a preparatory department and a classical department. The degree A. B. is conferred on those completing the classical course.

Lombard Street, a short street in London, which received its name from having been the residence of the Lombards, the money-lenders of former times, whose usurious transactions caused their expulsion from the kingdom in the reign of Elizabeth. It is now chiefly occupied by bankers, and is a place of much importance in the London commercial world. It is the English equivalent of Wall Street.

Lom'bards, Longobardi, or Langobardi, a Germanic or Teutonic people who at the beginning of the Christian era were dwelling on the lower Elbe. They make little appearance in history till the 6th century, when, under their king Alboin, they entered Italy in April 568, and, with the help of Saxons and others, conquered the northern portion, which hence received the name of Lombardy. From 713 to 744 the Lombards had a powerful king in the person of Liutprant, who extended his sway, at least temporarily, over the whole of Italy. From that time the power of the Lombards gradually declined, and finally Charlemagne captured Pavia after a six months' siege, and put an end to the Lombard kingdom (773 or 774), the last monarch being Desiderius.

Lombardy, lōm'bār-dī, Italy, an ancient kingdom, now a northern *compartimento* embracing the eight provinces of Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia, and Sondrio, with an aggregate area of 9,297 square miles and a population in 1901 of 4,282,728, or 460.66 to the square mile. It comprises that portion of Upper Italy which took its name from the Longobardi or Lombards. (See LOMBARDS.) After the fall of the Lombard kingdom this territory remained attached to the empire of Charlemagne and his successors till

843, when an independent kingdom of Italy arose, out of which in process of time a number of independent duchies and marquises (Friuli, Mantua, Susa, etc.) or republics (Venice, Genoa, Milan, etc.) were formed. When Austria acquired the duchies of Mantua and Milan these provinces were called Austrian Lombardy, a name which they retained till Napoleon formed in 1797 out of them and other districts the Cisalpine, afterward the Italian Republic, and at last, in 1805, the kingdom of Italy. By the Peace of Paris, 1814, and the act of the Congress of Vienna, 1815, Austria received back its old Lombard possessions; but in consequence of the war of 1859 was compelled to cede them to Victor Emmanuel, king of Sardinia, by the Peace of Zürich, and in the following year they became part of the kingdom of Italy.

Lombok', East Indian Archipelago, one of the Lesser Sunda islands, east of Java, between Bali on the west and Sumbawa on the east. Area 3,136 square miles. The island is mountainous and of volcanic origin. Between the two ranges which traverse the island, one of them rising to the height of 11,800 feet, there is a plain fertile in rice, cotton, maize, coffee, and tobacco. The upper and former ruling class are Brahmins, and the mass of the people, Mohammedans. The capital, Mataram on the west coast, was bombarded in 1894 by a Dutch expedition, since when the island is administered by a Dutch resident. Pop. 370,000.

Lombroso, Cesare, chā'zā-rē lōm-brō'zō, Italian scientist: b. Verona 1836. In 1862 he became professor of psychiatry at Pavia, and later of medical jurisprudence and psychiatry at Turin. He became widely known through his investigations of the abnormal human being, and through his theories deduced therefrom; theories which encountered great opposition and are not yet entirely accepted, but which formed in part the basis for the present criminal anthropology. He published numerous works, such as: 'The Criminal' (1887-95); 'The Man of Genius' (1890; Eng. trans. 1891); 'The Anarchists' (1895); 'The Causes of, and Contest against, Crime' (1902). Consult the study by Kurella (1892).

Lomond, Loch, lōH lō-mónd, Scotland, a beautiful lake in the counties of Stirling and Dumbarton. Its length is about 24 miles; the breadth at the lower or southern end, 7 miles, at the upper end less than half a mile. For 14 miles from the head the breadth does not exceed 1½ miles. The lake is almost entirely surrounded with ranges of hills; and its surface is studded with numerous islands. The principal hills are on the eastern side, where a branch of the Grampians culminates in Ben Lomond, 3,192 feet high, on the very border of the lake. Through the glens intersecting the surrounding hills, the drainage of the district flows into the lake by the Falloch, Endrick, Fruin, Luss, and other streams; and the river Leven at the southwestern extremity conveys the overflow to the Clyde. The greatest depth is in the narrower part of the lake, where in some parts it reaches 600 feet. Fish, including salmon, salmon-trout, pike, perch, eels, and powans, usually called fresh-water herrings, are abundant. Steamboats in connection with the North British and the Caledonian Railway ply on the loch.

LONDON

Lon'don, Jack, American author: b. San Francisco, Cal., 12 Jan. 1876. He was educated at the University of California which he left to go to the Klondike region, and in 1892 went to sea before the mast. He has tramped throughout Canada and the United States for sociological study, and spent some time in seal fishing in 1893. He won attention in 1900 by 'The Son of the Wolf; Tales of the Far North'; and his later works, 'The God of his Fathers' (1901); 'A Daughter of the Snows'; 'The Children of the Frost'; 'The Cruise of the Dazzler' (1902), have been popular.

London, England, the largest city in the world, the metropolis of the United Kingdom of Great Britain and Ireland, and of the British Empire, situated on both banks of the Thames River, about 40 miles from its mouth, the latitude and longitude of Saint Paul's Cathedral being respectively $51^{\circ} 30' 48''$ N. and $0^{\circ} 5' 48''$ W. Modern London consists of the conglomeration of former towns and villages in the counties of Middlesex, Surrey, and Kent, which, as encircling suburbs of the ancient cities and liberties of London and Westminster, in the course of time, chiefly during the 19th century, have become practically absorbed with them in a common urban aggregation, by the addition of miles of connecting streets of dwelling houses and other buildings. In 1855 a Metropolis Local Management Act was passed, defining for sanitary purposes, outside the nucleate city of London with 673 acres, 186 parishes covering an area of 74,839 acres, 31,562 acres being in the county of Middlesex, 23,123 acres in Surrey, and 20,064 acres in Kent. By the Local Government Act of 1888, this area was constituted the metropolitan county of London, and for administrative purposes was divided into 28 boroughs, including the city of Westminster, but excluding the city of London. Several of these boroughs are described under their respective headings.

Table of the metropolitan boroughs, with their size in acres and population in 1891 and 1901:

BOROUGHS.	Area acres	Pop. 1891	Pop. 1901
<i>North of the Thames.</i>			
City of London.....	673	37,702	26,923
City of Westminster.....	2,502	201,069	183,011
Bethnal Green.....	759	128,929	129,680
Chelsea.....	660	72,954	73,842
Finsbury.....	589	109,981	101,403
Fulham.....	1,703	91,790	137,289
Hackney.....	3,289	100,606	219,272
Hammersmith.....	2,286	97,283	112,239
Hampstead.....	2,265	68,126	81,942
Holborn.....	405	66,781	59,405
Islington.....	3,091	319,155	334,991
Kensington.....	2,291	170,071	176,628
Paddington.....	1,356	135,955	143,976
Poplar.....	2,328	166,880	168,880
St. Marylebone.....	1,473	144,083	133,301
St. Pancras.....	2,694	234,749	235,317
Shoreditch.....	658	124,727	118,637
Stepney.....	1,765	285,116	298,600
Stoke Newington.....	863	47,988	51,247
<i>South of the Thames.</i>			
Battersea.....	2,160	150,166	168,907
Bermondsey.....	1,499	136,014	130,760
Camberwell.....	4,480	233,706	259,339
Deptford.....	1,563	101,770	110,398
Greenwich.....	3,852	78,493	95,770
Lambeth.....	4,080	278,393	301,895
Lewisham.....	7,014	88,933	127,495
Southwark.....	1,131	202,479	206,780
Wandsworth.....	9,130	155,524	232,034
Woolwich.....	8,277	98,094	117,198
Total.....	75,512	4,228,317	4,536,063

The term London is therefore legally and properly applicable to the entire area within the county boundaries. But outside the county limits, the urban aggregation extends with numerous large and connected towns, to 15 miles around Charing Cross. These are embraced in the boundaries of the metropolitan and city police districts and constitute Greater London, bringing the total area to 443,421 acres with a population (1891) 5,633,806, (1901) 6,580,615.

Climate.—London is one of the healthiest of the large cities of Europe. The average annual rate of mortality per 1,000 in 1840-50 was 26.6; 1850-60, 24.4; 1860-80, 23.2. The death rate for the year 1901-2 was 17.6, little above that of all England. The mean annual temperature is about 50° , and the general range of the thermometer is from 20° to 81° ; the highest and lowest markings being, for the most part, in August and January respectively. The prevailing wind is the southwest, and there are few places in the kingdom where less rain falls. In the beginning of winter London is occasionally enveloped in fogs, which are especially dense in the lower parts, and greatly aggravated by the perpetual pall of smoke-laden air, overhanging the metropolis. This pall, estimated to weigh 7,000,000 tons, is occasioned by the general domestic and industrial use of bituminous coal. Even when this smoke-cloud does not take the unpleasant form of fogs it keeps the sunshine away to quite a considerable extent, in winter robbing London of fully half the sunshine it ought to enjoy, and giving to the metropolis that general gloom and begrimed aspect of buildings which is so depressing to visitors.

General Aspect, River, Bridges, Main Thoroughfares, etc.—London stands on alluvial deposits consisting of beds of clay and gravel, below which is the hard clay stratum known to geologists by the name of the "London clay," in the middle of the great chalk basin extending from Berkshire to the east coast. On the north bank of the Thames where the principal part of London stands, the site rises gradually at the rate of 36 feet per mile, while on the opposite bank the houses cover a nearly uniform and extensive flat, lying in some places several feet below the highest tides. Within the limits of London the Thames varies considerably in width. At Putney it is 550 feet, at Battersea 960, at Vauxhall 630, at Westminster 275 feet, at Waterloo 1,140 feet, while at Blackfriars it narrows down to 830 feet. At London Bridge it is 800 feet wide, and at Woolwich 1,470 feet wide. The bridge farthest down the river is Tower Bridge, just below the Tower of London—a bascule bridge which allows the passage of large vessels. London Bridge connects the city at King William Street with Southwark at the junction of Wellington Street and Tooley Street. About 500 yards further up the river stands Southwark Bridge, connecting the city and Southwark. About half a mile further west Blackfriars Bridge connects the city at Bridge Street with Southwark at Great Surrey Street. Waterloo Bridge, nearly half a mile above the former, including its approaches, supported on semicircular arches, is 2,456 feet long; it is perfectly level, and connects the Strand with the



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Waterloo road. Westminster Bridge crosses the river at the north end of the Houses of Parliament from Westminster to Lambeth. Further up the river Westminster and Lambeth are again connected by Lambeth and Vauxhall Bridges. The Chelsea Suspension Bridge connects Chelsea and Pimlico on the north side with the Battersea Park on the south. The Albert Bridge connects the Chelsea Embankment with Battersea to the west of Battersea Park; and the Battersea Bridge unites Chelsea and Battersea a little further west. Putney Bridge, a magnificent structure of granite, connects Fulham and Putney; and Hammersmith Bridge, the last in London, connects Hammersmith with Barnes. There are also six railway bridges across the Thames. One of them, at Charing Cross, displaced the old Hungerford Suspension Bridge, but is provided with a footway on one side, so that the original communication is preserved. Another bridge, belonging to the same line of railway, crossing the river from Cannon Street, City, is similarly provided. The two railway bridges at Pimlico, which look like one, belong to the London, Brighton, and South Coast Railway Company, and the London, Chatham, and Dover. The latter company owns a bridge close to Blackfriars Bridge. New bridges are building at Vauxhall and Kew, while that designed to be built at Lambeth is said to be as notable a combination of art and utility as the famous Alexander III. bridge in Paris. The once famous Thames tunnel, 2 miles below London Bridge, opened in 1843 as a roadway under the river, now serves as a railway tunnel. A subway under the river, lined with iron hoops, connects Tower Hill and Tooley Street, Southwark; and there is a great tunnel for foot-passengers and vehicles between Blackwall and East Greenwich. An underground electric railway to South London passes under the river at London Bridge. Besides these there are steam-boat ferries between Greenwich and the Isle of Dogs, and between North and South Woolwich.

Since the passing of the Metropolis Management Act of 1855 great changes have been made in the condition of London. The gigantic operations connected with the sewerage of London and the embankment of the Thames, from Blackfriars to Chelsea on the north side, and from Westminster Bridge to Lambeth on the south, have produced great changes, while important lines of streets have opened up districts formerly almost inaccessible. These operations have also absorbed the former little rivers and rills, leaving only a corner, an alley, or a street, for example, Fleet Street, with their name for a monument. Further extensive main drainage works are being carried on which are estimated to cost \$15,000,000, and extensive street improvements sanctioned by Parliament, are in progress, among which the most important is the street from Holborn to the Strand through the Soho district and the widening of the Strand. In all the districts of London, and particularly in the City and West End, there has latterly been great improvement in the quality of architectural decoration and in public buildings, and stone has to a considerable extent replaced brick and plaster, though not so far as to change the aspect of some localities. Though some of the leading streets are wide, others are narrow and irreg-

ular. The decorative character of the streets about Lombard Street and the Mansion House in the City has been fostered by the growth of numerous banking and insurance companies, while the new office and store buildings in various quarters, especially the one opposite St. Mary le Strand, the hotels and apartment houses on the American steel structure plan, added an entirely new style of brick architecture.

"The City"—the historic centre of London—is bounded south by the Thames; it extends north to Charterhouse Square, east to Middlesex Street, and west to the New Law Courts. Till 1878 this last boundary was marked by Temple Bar, an old gateway crossing Fleet Street near the Temple; but in that year this structure was removed, and a memorial was erected on the site. The portion of the City inside the area of the former mediæval walls is known as "London within the walls"; and all the wards are bounded by the site of the old walls; the portion outside extends irregularly all around, and is known as "London without the walls."

Of the streets that run through Modern London the most important from west to east is that which enters from Kew into Hammersmith, and passing through Kensington, forms the finest of all the approaches to London. It stretches on through Brompton, Knightsbridge and Piccadilly, past fashionable Belgravia, with Kensington Gardens, Hyde Park and Paddington on the north, and with Apsley House and numerous other palatial edifices facing the Green Park, which constitutes its south boundary for about half the length of Piccadilly. This line is broken at the east end of Piccadilly, but passes by Regent Street (or by the Haymarket) and Trafalgar Square into the Strand, which continues it farther east and much nearer the river, and it stretches on past the Temple, along Fleet Street, Ludgate Hill, St. Paul's Churchyard, where it runs into Cannon Street, leading to the Tower on one side, and on the other into Cheapside, Poultry, Lombard Street, Fenchurch Street, Aldgate, and by Whitechapel road, and Mile-end road through the congested poorer districts to the county boundary at Bow. The next great artery between the west and east extends along the Uxbridge road from Acton, entering the county boundary at Shepherd's Bush and passing through Notting Hill, along Oxford Street, through Holborn and Newgate Street, where it joins the more south line above described, at the west end of Cheapside. Farther north is a third line, extending from near Kensington Gardens, through Oxford and Cambridge Terrace along the Marylebone and Euston road to Islington, and thence by the Pentonville and City road to Finsbury Square. Among the leading thoroughfares running north and south the extreme west is Edgware road, which enters the county at Kilburn, terminating at its south extremity in Oxford Street, from which it runs northwest, but communicating through Park lane with Piccadilly, a little to the west of which, from Hyde Park Corner Place, Grosvenor Place leads down to Buckingham Palace road, from which Vauxhall road forms a connecting line with the river. Park lane and Grosvenor Place on this line contain many of the most select residences of the aristocracy. East of Edgware road Regent Street

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from the Conquest to the present time. In the southwest angle is the Victoria Tower, supported on four pointed arches 60 feet in height; it is 75 feet square and 340 feet in height. There is also a tower in the centre, 300 feet high by 60 feet, surmounted by a lantern; and the clock tower, at the north end of the edifice, with its richly decorated spire, rises 320 feet. The House of Peers is an apartment 97 feet long, 45 feet wide, and 45 feet high; magnificently decorated throughout with carved oak paneling, a profusion of gilding, paintings in fresco, and richly stained glass windows. The House of Commons is a somewhat smaller apartment, fitted up in a much plainer style. Paintings in fresco and the water-glass medium, and statues of great statesmen have been added to the internal decorations; and a statue of the architect has been placed on the staircase leading up to the committee rooms. Westminster Hall, the most magnificent hall in the kingdom, 290 feet long, was built by William Rufus and improved by Richard II. It has recently been exposed on the west side, the ground laid out as an ornamental garden, and a fine statue of Cromwell erected therein. The hall is now not used except as a member's entrance to the House of Commons. In Old Palace Yard is an equestrian statue of Richard Cœur de Lion by Baron Marochetti, and a statue of Canning.

Palaces.—St. James', erected by Henry VIII. from a design by Holbein, at the foot of St. James' street, is an irregular and picturesque brick building. It is well adapted internally for royal levees and drawing rooms, which are held here during the fashionable season. Buckingham Palace, facing the west end of St. James' Park, was built by George IV., and consists, since the erection of the east front, of a quadrangular range of buildings. In the gallery, which is 160 feet long, are some good pictures. The king resides here occasionally in the spring and summer. Whitehall—the Banqueting House—designed by Inigo Jones in the Palladian style, is the only remnant of the ancient palace of Whitehall; the ceiling, painted by Rubens, is the most extensive work of that artist existing in the country. Kensington Palace, situated in Kensington Gardens, is a brick building of the Jacobean period, and was thrown open to the public by Queen Victoria shortly before her death. It was the birthplace of Her Majesty. Lambeth Palace, on the Surrey side of the river, opposite the Houses of Parliament, has been for many centuries the residence of the archbishops of Canterbury. It is a brick edifice, and comprises a great variety of styles in architecture, from Early English downward, and contains a library of 30,000 volumes. Fulham Palace, the residence of the bishops of London, is a building of no architectural pretension. It is pleasantly situated on the Thames, and at one time had extensive and well-timbered grounds. Greenwich Palace, once the home of the Tudor and Stuart sovereigns, is a stone building of considerable beauty, now used as a training school for the navy.

Government Offices.—These are mostly situated in and near Whitehall. The Treasury, Home Office, and Education Department occupy one range of buildings, which have been improved by a uniform and handsome façade.

The India Office and the Local Government Board faces St. James' Park. The Horse Guards, which are somewhat nearer Charing Cross, have little to admire in their external appearance, but opposite, and next to the Banquet Hall of the old Whitehall Palace, from the window of which Charles I. stepped to his execution, rises the New War office, and farther on the New Admiralty office. An extensive pile of government offices, for the Foreign Office and the Colonial Offices, has been erected in Downing Street. The style is Italian and the building exhibits a large amount of decorative detail, part of it in red and other colored marbles and granites. Some of the public offices are in Somerset House, once a royal palace of Charles II. It has a spacious and handsome quadrangle, finished in 1782, from designs by Sir W. Chambers: its north façade, 200 feet in length, faces the Strand; and its south front, 800 feet long, overlooks the river. The Post-office, near St. Paul's, is a spacious and handsome building. It is 390 feet long, 130 feet wide, and 64 feet high. Its façade, which is toward St. Martin's-le-Grand, has three Ionic porticos. A supplemental building for telegraph and other business occupies the opposite side of St. Martin's-le-Grand. The Mint, a stone building of the ordinary Georgian architecture, finished in 1810, stands on Tower Hill, and occupies about 10,000 square yards. The royal arsenal and dockyard for military stores is at Woolwich.

Courts of Law.—London is the seat of the supreme courts of the kingdom. Several of these were long accommodated at Westminster Hall, but in 1883 were removed to the New Law Courts at the junction of the Strand and Fleet Street. This great building occupies an area of nearly four acres. It is of a somewhat heavy mediæval character, a large western tower being its chief feature. The Old Bailey, adjoining the famous Newgate Prison, has, with the latter, been demolished to make way for the palatial Sessions House of the City of London. It is the central criminal court for the trial of prisoners who have committed serious offenses in the metropolitan district. One or more of the judges of the law courts sit here also in the old court, while the new court is presided over by the recorder and common sergeant of the City of London. There are numerous county courts within London for the trial of small debt cases. Besides the above there are also the Clerkenwell Session house; the city police courts, which are held at the Mansion House and Guildhall, and are presided over by the lord-mayor and one of the aldermen; and numerous police courts, each of which is presided over by a barrister of at least seven years' standing. The Inns of Court as they are called are four, the Inner Temple, Middle Temple, Lincoln's Inn, and Gray's Inn. Every law student, before he can be called to the bar, has to be entered as a member of one of these inns, and to dine a certain number of times in the common hall. The Inner and Middle Temple are close to Temple Bar, between Fleet Street and the river. The roof of Middle Temple Hall, built in 1572, is considered the best specimen of Elizabethan architecture in London. Lincoln's Inn is situated between Chancery Lane and the extensive square called Lincoln's Inn Fields,

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1. Trafalgar Square.

2. Houses of Parliament.

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now open as a public garden. A handsome hall and library in the Tudor style, from the designs of Hardwick, have been erected in the gardens. Gray's Inn stands on the north side of Holborn. The gardens, first planted about 1600, were a fashionable promenade in the time of Charles II., and for some time after. The other "inns," Staple Inn, Barnard's Inn, Furnival's Inn, Clifford's Inn, New Inn, Sergeant's Inn, are now all in private hands and not connected with the law.

Clubs.—Many of these establishments, having most elaborate and ornate buildings, are among the principal architectural features of West London. They are situated chiefly in and near Pall Mall and vie with each other in elegance and luxury. The principal are: the Atheneum, possessed of a fine library, and having a great many artists and men of science and letters among its members; the Army and Navy, the United Service, the Guards', and the Junior United Service; the Carlton, the great Tory club, standing side by side with the Reform club in Pall Mall, the former numbering 1,800 and the latter 1,400 members; the Junior Carlton; the Oriental; the Travelers'; Brooks', one of the oldest of the clubs; White's, a still older club, much frequented by the Conservative nobility; the Conservative; the Devonshire; the Oxford and Cambridge; the Garrick, frequented by lovers of the drama; and four political clubs, which have the largest numbers of members, the Constitutional having 6,500, the National Liberal 7,000, the Junior Conservative 5,500, and the Junior Constitutional 5,000. Clubs are rapidly extending in London, and many have been established of late years to meet special purposes.

Hotels.—The Grand Hotel, Trafalgar Square, occupying part of the site of old Northumberland House; the Victoria Hotel and Hotel Metropole in Northumberland Avenue; the Hotel Cecil in the Strand; the Savoy Hotel on the Embankment; the Carlton Hotel at the corner of the Haymarket; the Russell Hotel, occupying the greater part of the east side of Russell Square, recently built; and De Keyser's immense hotel at Blackfriars, are the most important and attractive. There are large hotels at Charing Cross and Cannon Street in connection with the South Eastern railway, at St. Pancras in connection with the Midland railway, and at Marylebone in connection with the Great Central railway, the last named being the largest and one of the handsomest in London. Also associated with railways are the Great Western hotel at Paddington; the Great Northern hotel at King's Cross; the Grosvenor hotel at Pimlico. Other large hotels are the Langham hotel, Portland Place; the Westminster Palace hotel in Victoria Street; the Salisbury hotel, in Salisbury Square, Fleet Street; the First Avenue near Gray's Inn; and the famous Ship hotel at Greenwich, where the ministerial whitebait dinner used to be held, while new hotels in London are being erected almost everywhere.

Theatres, Public Halls, etc.—The principal theatres are Covent Garden (the Royal Opera House), opened in 1858; Her Majesty's Theatre, Haymarket, the historic Drury Lane, the Haymarket, the Princess', the Lyceum (now being demolished), the Strand, the Adelphi, the Sur-

rey, the Gaiety (recently demolished), the Globe, the Opera Comique, the Pavilion, the Standard, the Vaudeville, St. James', the Savoy, the Avenue, the Comedy, Criterion, Terry's, the Lyric, the Garrick, the Shaftesbury, the Duke of York, the Prince of Wales', Wyndham's, and the Court. Local theatres have been built in many of the outlying parts of London. St. James' Hall, remarkable almost entirely for its interior, is chiefly devoted to musical entertainments of a high class. The Queen's Hall in Portland Place, and the Albert Hall at Kensington, are devoted to high-class music. Hanover Square Rooms were once famous as concert rooms. Exeter Hall, in the Strand, is occupied by the Young Men's Christian Association, and is used also for the annual May meetings of the different religious societies. The Freemasons' Hall in Great Queen Street, is well known, and Olympia, at West Kensington, is a large and imposing hall in an extensive area. The Congregational Memorial Hall, and the Agricultural Hall, Islington, the largest covered area in London, are also important buildings of this kind. The Empire and the Alhambra in Leicester Square are the chief of numerous music halls in London, where in general the entertainment is not of a very elevated description, though the improvement of late years is marked.

Markets.—These are numerous, but have generally little to attract either in external beauty or in internal arrangement. The principal ones are: Billingsgate for fish; the Borough Market, Southwark, and the famous Covent Garden for vegetables, fruit, flowers, and plants; Leadenhall for poultry, game, etc.; Deptford for foreign cattle; Smithfield for fresh meat, poultry, and fish; the Islington cattle market, in the Caledonian road. The Spitalfields market and the Woolwich market, for vegetable products, are included in the public markets. But London is inadequately provided. The city corporation own all the largest markets, and exercise charter rights to prevent others being erected. The result is that all retail markets are in the hands of costermongers, who line many of the most prominent of the public thoroughfares with their barrows and portable stalls, and who are under no public control as to the produce they sell.

Museums, Galleries, Libraries.—The British Museum (q.v.), founded in 1753, in Great Russell Street, is a spacious and imposing edifice, with a classical façade and sculpture in the pediment, built between 1823 and 1857. It contains an immense collection of books, manuscripts, engravings, drawings, sculptures, coins, minerals, stuffed animals, fossils, preserved plants, etc., and a magnificent collection of ethnographical objects, Egyptian, Assyrian, Etruscan, Greek, and other antiquities. An extensive building (about 650 feet long) has been erected in the South Kensington quarter for the accommodation of the natural history collections. The museum of the Royal College of Surgeons, on the south side of Lincoln's Inn Fields, a rather handsome building, contains a magnificent collection of human skulls from all parts of the world, and many curious surgical preparations. The Soane Museum, on the north side of Lincoln's Inn Fields, possesses many valuable objects, consist-

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ing of books, paintings, prints, MSS., drawings, maps, models, plans, etc. The Dulwich College gallery contains many interesting pictures left by Alleyne, the contemporary actor of Shakespeare's age. The great South Kensington or Victoria and Albert Museum contains most valuable collections, carefully arranged for purposes of instruction, in connection with which are the schools and headquarters of the Department of Science and Art. Museums have also been established at Bethnal Green and in South and North London, and quite recently Hertford House, with its priceless art treasures, the gift of Sir Richard Wallace, and the Horniman Museum at Forest Hill, the gift of P. J. Horniman, have been added to the London museums. The chief picture gallery in London is the National Gallery, on the north side of Trafalgar Square. It contains about 1,200 paintings, acquired partly from donations, partly by purchase. The National Portrait Gallery is a collection of over 1,100 portraits, busts, and medallions brought together since 1858. For this collection a new building besides the National Gallery has been provided by private munificence; and the Tate Gallery of British Art, on the Thames Embankment has been similarly acquired. The Royal Albert Hall of Arts and Sciences, a memorial to the late prince consort, is a huge building between the Horticultural Gardens and Kensington road. It was erected for the purposes of science and art, musical performances, exhibitions, etc. It is chiefly used for concerts and is capable of accommodating an audience of 8,000, while the orchestra itself accommodates 1,000 performers. The building also contains a picture gallery. In Hyde Park, immediately opposite this building, is the Albert Memorial. The north wing of Burlington House, Piccadilly, has been granted to the Royal Academy and a suite of rooms built in the rear of it for exhibitions. The east and west wings of Burlington House are occupied by various learned societies, the Royal Society, the Society of Antiquaries, and others. Near the South Kensington Museum and the Albert Hall is the splendid block of buildings of the Imperial Institute, with its various permanent collections and exhibitions, and institutions. Besides the British Museum library, the chief libraries are: Lambeth Palace library, the Guildhall library, Sion College library, the London library (subscription), London Institution library, and in addition large circulating libraries and many free public libraries supported by taxes.

Educational Institutions.—At the head of these stands the London University (q.v.) which promises to become the foremost scientific university in the kingdom. Other institutions are denominational colleges for theology (in some combined with general education); the Royal Naval College, Greenwich; the Royal Military Academy, Woolwich; the Royal College of Science; the medical schools attached to the hospitals; Royal Academy of Music; Royal College of Music; Trinity College, chiefly for music; several colleges for ladies, etc. Among the grammar and secondary schools are: St. Paul's School, founded in 1509, which provides a free education for 153 boys, with scholarships to Oxford and Cambridge; the Merchant Tailors' or Charterhouse School (q.v.); Christ's Hospital

(q.v.); Westminster School, founded by Queen Elizabeth in 1560; University College School, King's College School, City of London School, Mercers' School, and schools of the several city companies. Besides the above and numberless private schools, there are the City and guilds institutions for technical education, many high schools for girls, many free schools, numerous schools of the National Society, and more than 400 schools of the London School Board. Several polytechnics and centres of technical education have been equipped and supported by the London county council, who have also established a system of county scholarships for students, which promises to be of great value.

Scientific Associations, etc.—Associations for promoting science, art, learning, etc., are exceedingly numerous. The chief are the Royal Society, Burlington House, founded in 1660; the Society of Antiquaries, in the same building, originally founded in 1572; the Royal Academy (of painting, etc.), in Trafalgar Square, founded in 1768; the Royal College of Physicians, founded by Linacre, physician to Henry VIII., in 1518; the Royal College of Surgeons; the Royal Geographical Society, with a choice geographical library and large collection of maps; the Institution of Civil Engineers; the Royal Institute of British Architects, possessing a good library of architectural works; the Royal Institution of Great Britain, established in 1799; the Royal Horticultural Society, which possesses the botanic gardens in Regent's Park, as also at South Kensington and at Chiswick; the Royal Astronomical Society; the Royal Asiatic Society; the British Association; the Zoological Society, with its collection of animals in Regent's Park; the Geological Society, and the Anthropological Institute.

Hospitals and Charitable Institutions.—Besides the three great endowed hospitals: St. Bartholomew's, in West Smithfield; Guy's, Southwark; and St. Thomas', Lambeth, occupying a large and splendid range of buildings on the Thames Embankment opposite the Houses of Parliament; there are the London Hospital, St. George's Hospital, the Middlesex Hospital, Westminster Hospital, Charing Cross Hospital, King's College Hospital, University College Hospital, St. Mary's Hospital, and Royal Free Hospital, all with medical schools attached. Other general hospitals are: The Great Northern Hospital, the West London Hospital, and the Metropolitan Hospital; besides the German Hospital, Dalston; hospitals for special diseases, as consumption, fever, cancer; hospitals for women, for children, etc. Bethlehem Hospital (Bedlam), in St. George's Fields, south of the river, is the chief hospital for lunatics; St. Luke's Hospital is also for insane patients. The Foundling Hospital (see FOUNDLING) is rather an asylum for illegitimate children generally than a hospital for foundlings. Chelsea Hospital and Greenwich Hospital are institutions by themselves.

Prisons.—There are altogether about a dozen criminal prisons. The most celebrated of these, Newgate, near St. Sepulchre's Church, a gloomy and massive structure, the scene of a great many executions, was pulled down in 1903. Millbank penitentiary, or prison, an immense brick edifice with external walls enclosing upward of 16

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acres, has also been demolished, and the site utilized partly for workmen's dwellings and partly for the Tate picture gallery. The chief existing prisons are Clerkenwell prison, the Wandsworth prison, Holloway prison, for females, debtors, etc.; the Westminster House of Correction, for female prisoners, in Tothill Fields, built on the Panopticon principle, with a courtyard in the centre 250 feet in diameter, and conducted on the silent system; the model prison, Pentonville, containing 1,000 cells, in which the inmates are taught useful trades; Wormwood Scrubs prison, a large building standing, almost isolated on the borders of London.

Squares and Public Monuments.—The squares of London are characteristic; many of them are of great beauty and extent, and planted with shrubbery. Among them are: St. James' Square, north of Pall Mall; Eaton, Belgrave (10 acres), Grosvenor, Portman, Cavendish Squares, all in the west end; Russell Square (10 acres), Bedford, Bloomsbury, Tavistock, and Euston Squares, in the west central part of the town; Trafalgar Square, at Charing Cross, fronting one of the principal thoroughfares and adorned with public buildings, fountains, the Nelson Column, and statues of Charles I., George IV., and others. The most conspicuous public monuments are: "The Monument," on Fish Street Hill, London Bridge, a fluted Doric column 202 feet high, erected in 1677 in commemoration of the great fire of London; the York Column, at the south end of Waterloo Place, a plain Doric pillar of granite 124 feet high, surmounted by a bronze statue of the Duke of York; a fluted Corinthian column in Trafalgar Square, 176½ feet high, raised in honor of Nelson, and surmounted with a colossal bronze statue of the hero, having the pedestal decorated with bronze sculptures in high relief, and four magnificent lions, by Sir E. Landseer, at the angles; the Albert Memorial, Hyde Park, the most splendid and costly monument of recent times, being a Gothic structure 176 feet high, with a colossal seated statue of the prince under a magnificent canopy elaborately sculptured and adorned; and the projected magnificent memorial to Queen Victoria with its beautiful surroundings in front of Buckingham palace. There is a statue of the Duke of Wellington in front of the Exchange, and a statue of Sir Robert Peel at the top of Cheapside. Statues of Sir Charles J. Napier, Sir Henry Havelock, and General Gordon stand in Trafalgar Square. On the Thames Embankment, not far from the Temple, now stands the Egyptian obelisk known as Cleopatra's Needle; and west of it are statues of Robert Raikes, the founder of Sunday schools, General Outram, John Stuart Mill, and others. In Waterloo Place is a memorial to the Guards who fell in the Crimea, and here is also a statue of Sir John Franklin. An equestrian statue of the Duke of Wellington at Hyde Park corner was erected in 1888. A monument to Sir Hugh Middleton, who brought the New River water to London, has been erected on Islington Green. Among other memorials are: The Westminster Crimean Memorial, in the open space at the west of the Abbey; the Peabody statue behind the Royal Exchange; an equestrian statue of Prince Albert in Holborn Circus, a statue of

Carlyle on Chelsea Embankment, and of Lord Beaconsfield in Westminster Palace Yard.

The Parks.—Of these the finest and most fashionable is Hyde Park (q.v.), which lies between the Uxbridge and Kensington Roads, and contains about 400 acres. Kensington Gardens, with which Hyde Park communicates at several points, are beautifully wooded and finely laid out. Here carriages are not admitted. St. James' Park (83 acres) extends from Buckingham Palace to the Horse Guards, and in its centre is an ornamental sheet of water, studded with islets covered with trees and shrubs, and around which swim a great variety of aquatic fowls. The Green Park, 71 acres in extent, lies between St. James' Park on the south and Piccadilly on the north. Regent's Park, on the north side of London, covers an area of over 400 acres. Round the park is a drive nearly three miles long, and an inner circular drive encloses the Botanic Gardens. At the north end are the Zoological Gardens, to which a fine broad avenue leads along the centre of the park. Battersea Park is on the south bank of the Thames, opposite to Chelsea Hospital. Victoria Park is on the northeast of London, laid out and planted as a place of recreation for the poorer inhabitants of this part of London. Southwark Park is another artificially formed recreation ground. Greenwich Park is one of the most delightful features of South London, and has great natural beauties; the famous Greenwich Observatory is situated here. There are many other parks acquired for use of the public during late years. Brockwell Park in Camberwell, Ravenscourt Park in Hammersmith; Finsbury Park and Clissold Park on the north borders of London, are the most extensive. But even more typically a part of modern London are the numerous and beautiful heaths and commons preserved for the public. Hampstead Heath on the north, Blackheath and Plumstead Common on the southeast, and Totting and Streatham commons on the south are the most extensive.

Places of Popular Resort.—There are various places of popular resort in London. The Exhibition at Earl's Court, a vast open-air entertainment accompanied by exhibits of special descriptions arranged in courts and buildings within the grounds, is the largest. Olympia at Kensington is of less magnitude. The Zoological Gardens and the Botanical Gardens, both in Regent's Park, are very largely frequented. The People's Palace, established by contributions of the benevolent, in the East End of London (Mile-end road), and opened in 1887, provides a hall for concerts and other entertainments, a library and reading rooms, swimming baths, gymnasiums, social meeting rooms, winter garden, technical schools, etc., its object being the moral and intellectual improvement of the working classes of East London. Outside London there are other places of this description. The most important is the Crystal Palace (q.v.), at Sydenham, formed to a considerable extent of the materials of the exhibition building of 1851, removed from Hyde Park. It was originally designed as a great educational museum of art, natural history, and ethnology; and its gardens and fountains were to rival or surpass those of Versailles. For years music has taken an important place in the

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arrangements of the palace. Entertainments of merely amusing character have also been largely introduced. A somewhat similar building is the Alexandra Palace, occupying a conspicuous site on Muswell Hill on the north. Kew Gardens (q.v.) on the west and Hampton Court Palace (q.v.) and grounds, built by Cardinal Wolsey and enlarged by William III., further out toward the southwest.

Lighting, Sewerage, and Water.—London is supplied with gas by eight separate companies. These companies include in their area of supply a considerable district outside London. Since 1886 a large number of electric lighting companies have come into existence, in 1901, 16 companies and 15 local administrations possessing statutory powers to supply electricity. The sewerage works with which the Metropolitan Board was charged, were formally opened in 1865. The system consists of lines of intercepting sewers on both sides of the Thames intersecting the old outlets which are retained for service during heavy rainfalls. It consists of three main lines on the north of the river, at different levels, called respectively the High Level, Low Level, and Middle Level Sewers; and of two on the south side, called High and Low Level Sewers. The lines on the north side converge at the Lea river, whence, after the Low Level sewage has been pumped to the higher level, the whole flows in three parallel brick culverts, built in an embankment upward of 5 miles in length, on to the Northern Outfall and reservoir, about 14 miles below London Bridge. On the south side the Low Level sewage is pumped to the higher level at Deptford, whence the whole is conveyed to a point near the mouth of the river. The total length of the sewers is 82 miles, and the area drained is 120 square miles, together with sundry small districts, accommodated by the London system. Considerable extensions are in progress. Works have been established for precipitating the sewage; the deposit after precipitation, amounting to 5,000 tons daily, is carried out to sea and deposited several miles from land. The metropolitan water supply has been considerably amended of late years. There are eight companies supplying London and an extensive area around extending into Middlesex, Essex, Kent and Surrey. The total quantity of water supplied by these companies amounts to over 200,000,000 gallons daily. The largest quantity is supplied by the East London Company. Rather more than 113,500,000 gallons of this total is supplied from the Thames river, 55,250,000 from the Lea river, 33,500,000 from springs and wells. By an act passed in 1852 all the companies making use of the Thames are obliged to draw from above the limit of the tidal flow. Even above this point the water is not free from pollution by the sewage of numerous populous towns, and by the drainage of richly-manured land. Means are adopted for storing the water, and it is all filtered through layers of gravel and sand before entering the mains; but the system of supply is liable to various objections, and the total quantity is inadequate to meet the entire wants of the population. Commission after commission, and committee after committee, have examined and reported on this important subject, but in 1896, 1897, and 1898, the whole east end of London

and much of the south suffered from want of proper water supply.

Cemeteries.—Extramural interment is of comparatively recent date. Kensal Green Cemetery, in which several royal personages have been buried, was opened in 1832; it occupies about 70 acres of ground, and is tastefully planted and laid out. Kensal Green Roman Catholic Cemetery occupies 30 acres. The cemeteries at Brompton, the Tower Hamlets, Bethnal Green, Nunhead, and Norwood are the only intra-mural places in which interments are permitted, excepting in the case of interments in St. Paul's and Westminster Abbey; and some of the cemeteries named would now be closed were they not provided with their special acts. At the Woking Cemetery, which occupies about 2,000 acres, the poor of several of the London parishes are buried, special railway accommodation being provided for cemetery traffic. Some of the parishes, as Marylebone and St. Pancras, and Paddington, have their own cemeteries. The City of London Cemetery is at Ilford, in Essex, and other cemeteries are also situated outside.

Communications.—The London population commands two systems of locomotion, namely, internal and external. The former has reference to the purely London requirements, and is by means of omnibuses, cabs, tramways, steam-boats, and railways; the latter has reference to the connection of London with the rest of the kingdom and the Continent, and is by canals, railways, and the Thames. The internal traffic of London has become almost overwhelming. There are 12,000 cabs, 3,000 omnibuses, 1,200 tramway cars, besides the Metropolitan, the Metropolitan District and the Electric Railway systems, and the local systems on other lines. These are extending in all directions. The great English railways long ago reached the limit of their ability to cope with suburban traffic in and out of London. The old underground railway was designed to be complete in an inner and outer circle, but the outer circle was found to be insufficient before it was built, while the inner circle does not even touch what might be called suburbs. Yet so long as it was without competition the two companies owning this system drew great dividends and ignored the demands of their dependent patrons for better service. Not until competition arose in the shape of the Central London electric tube railway did the directors of the District and Metropolitan lines bestir themselves. American enterprise in acquiring control of the District Underground brought a flood of underground railway schemes forward, and parliamentary committees have been kept busy deciding between rival schemes. They have been careful to reserve all manner of rights to the government, refusing, for instance, to grant any route unless the proposed company agreed to provide and maintain a subway for pipes and wires along its line. This is an effort to unravel the tangle of such things which the least upturning of the streets shows. These lines are also refused complete independence of each other, and are compelled to arrange transfers and joint time tables. There are now 52 miles of deep railways running and authorized, estimated to cost £500,000 per mile. The great objection in London to shallow tram-subways,

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such as are now used in Paris and in New York, is the necessity of torn-up streets for a long period, as well as the difficulty of disposing of the soil so near the surface. The tubes, after the fashion of burrowing animals, must necessarily dispose of their soil at the end of their tunnel only. It is safe to predict that in ten years it will actually be possible to traverse London by public conveyance more quickly than one could walk or go in a cab. Now, for lack of means, or of co-operation when there is means, the task is hopeless. The number of passengers in one year traveling by omnibus is nearly 200,000,000, and by trams nearly 300,000,000. Side by side with all this activity along the roadways, the Thames has almost been allowed to drop out of existence as a local travelers' route, for though small steamers ply from wharves and piers between Kew and Woolwich, the service is at present altogether inadequate. The principal railway stations are: The Great Eastern, Liverpool street, Bishopsgate; the London and North Western, Euston Square; North London, Broad street; Great Western, Paddington; the Great Northern, King's Cross; Midland, St. Pancras; Great Central, Marylebone; South Eastern, London Bridge, where there is a congeries of stations, Charing Cross and Cannon street; London, Chatham, and Dover, Ludgate Hill, and Victoria; the London, Brighton, and South Coast railway, Victoria and London Bridge; the South Western, Waterloo Bridge. Many of these stations communicate by the Metropolitan and District railways, distinct systems, but both popularly known as the "Underground," affording means of internal communication within the city. Many of the termini are elaborate piles of costly architecture, and have associated with them large and handsome hotels. The Thames affords communication by steam vessels with the most important points on the British and Continental coasts, as well as with all parts of the world.

Manufactures.—It is impossible within the limits of this article to specify the different kinds of articles manufactured in London. It contains the largest breweries, distilleries, and sugar refineries in the kingdom; was long the principal seat of silk weaving; has extensive manufactures in metal, including machinery of all kinds, plate, jewelry, watches, and brass work and an enormous production of books and prints. Millinery, the making of clothes and of boots and shoes are also extensive branches of industry. Besides these, there are cabinet making, coopering, coach building, leather working, hat making, ship-building, rope making, mast making, etc., all of which are departments of manufacture conducted on a large scale; and there are numerous extensive chemical works, soap manufactories, and dye works.

Commerce, Docks, etc.—The port of London extends from London Bridge to the Nore and is divided into the Pool, Limehouse Reach, Greenwich Reach, Blackwall Reach, etc. It is under the care of the corporation of the city for sanitary purposes, under the Thames Conservancy for navigation, and under all sorts of other authorities for various other purposes. It is probably the worst managed port in the world. The docks, some of which are of great

extent, are surrounded by wharves, sheds, storehouses, vaults, and warehouses of the most spacious kind. St. Katherine's docks, London docks, the West India docks, the East India docks, and the Millwall docks (in the Isle of Dogs) extend along the north side of the river at intervals from the Tower to Blackwall; and on the south side, between Rotherhithe and Deptford are the Surrey Commercial docks. The tide rises 18 feet at springs and 14 feet at neaps at the London docks; and the depth at low water, spring tides, on the outer sill of St. Katherine's docks is 10 feet. The largest of these older docks is the West India import dock, 2,600 feet long and 500 broad. The dock accommodation of the port was greatly increased by the construction of the Victoria and Albert docks, which follow next in order on the north side of the river (opposite Woolwich) and have a combined length of $2\frac{3}{4}$ miles, with a water area of 175 acres. The Victoria dock was opened in 1855, the Albert dock in 1880. The depth over the sill of the east entrance of the latter at high water is 30 feet. Besides these, there are now the splendid docks at Tilbury, on the Essex shore opposite Gravesend, constructed for the purpose of admitting the largest vessels at any state of the tide. Here there are a tidal harbor, graving dock, 3 miles of quays, sheds covering 20 acres, etc. The vessels belonging to the port in December 1900, numbered 1,252 sailing and 1,653 steam; aggregate tonnage, 1,716,616. Its exports of British and foreign produce in 1900 amounted to £91,502,552; the imports to £175,901,307. Out of 11,118 vessels that entered in the foreign and colonial trade in 1900, 5,999 were British, 1,343 Dutch, 1,133 Norwegian, 1,003 German, 444 Swedish, 369 Danish, 353 Belgian, 156 French, 124 Russian, 83 Spanish, 27 Italian, 22 Austro-Hungarian; 62 United States, the total of all foreign vessels being 5,119. For East and West India produce London is the great port; tea, sugar, tobacco, wine, corn, timber, tallow, hides, wool, and drugs form large items.

The amount of customs revenue received in 1900 was £11,388,560. The value of the imports is over one third, of the customs revenue about one half of the whole amount for the United Kingdom.

The following table gives particulars for 1900 of the shipping entering and clearing at the port of London from and to foreign countries and British colonies and coastwise:

1900	Sailing	Steam	Tonnage
ENTERED			
Foreign	1,443	7,965	7,153,431
Colonial	523	1,187	2,427,323
Coasting	4,094	10,602	5,972,147
Total.....	6,060	19,754	15,553,001
CLEARED			
Foreign	1,113	6,219	5,636,433
Colonial	235	536	1,483,240
Coasting	5,609	12,686	7,827,763
Total.....	6,957	19,441	14,947,436

Administration.—The most ancient civic officer of London is the lord-mayor of the city of London. He is annually elected from among the aldermen who have been sheriffs of the city, on 29 Sept. and installed in office on 9 Nov. when a procession takes place, called the lord-

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mayor's show. The court of aldermen consists of 26 members, including the lord-mayor. They are chosen for life by the taxpayers of the 26 wards into which the city is divided, each being the representative of a separate ward. They are properly the subordinate governors of their respective wards, under the jurisdiction of the lord-mayor, and preside over the business in the courts of Wardmote. The civic sheriffs, two in number, are annually chosen by the livery or general assembly of the freemen of London. The common council is a court consisting of 206 representatives returned by 25 of the wards in proportion to their relative extent; the 26th, or Bridge Ward Without, being represented by an alderman. The general business of this court is to legislate for the internal government of the city, its police, revenue, etc. The recorder is generally a barrister of eminence, appointed for life by the lord-mayor and aldermen as principal assistant and adviser to the civic magistracy and one of the justices of oyer and terminer. The "livery" of London is the aggregate of the members of the several city companies, of which there are 75. Of these, 12 are termed great companies and from one or other of them the lord-mayor was formerly chosen. In order of precedence they are: The Mercers, Grocers, Drapers, Fishmongers, Goldsmiths, Skinners, Merchant Tailors, Haberdashers, Salters, Ironmongers, Vintners, Clothworkers. Many of the companies are very rich and possess large halls. Besides the ancient city of London there are under the act of 1899, the 28 metropolitan boroughs, already enumerated, each of which for local purposes is governed by a mayor, aldermen, and council. The governing authority for the entire county of London is the county council, which consists of the chairman of the council, 19 aldermen, and 118 councillors, the latter being elected by the taxpayers of the several divisions, which are, however, not coincident with the boroughs. There are also two other governing bodies for the county, the School Board and the Metropolitan Asylums Board, the former elected by the taxpayers, the latter by the Boards of Guardians.

The Police.—The city police, confined to the city proper, is administered by the city corporation as a municipal force and numbers about 900 men. The metropolitan police is not municipal. It is administered by a commissioner appointed by the Home Office. It consists of over 15,000 men, whose central offices are New Scotland Yard, a massive building on the Embankment near Westminster bridge. Its area of jurisdiction extends for 15 miles from Charing Cross.

For postal purposes the authorities divide the major portion of Greater London into districts designated by their initial letters, E. C., W. C., W., S. W., S. E., E., N., N. W., signifying East Central, West Central, etc.

Sociology.—Statistics to March 1902 show that the population of Greater London at that date was 6,581,372. Of this number 1,202,072 were born in England (outside London), 56,605 in Scotland, 60,211 in Ireland and 38,899 in other parts of the British empire. The alien population numbers 79,804 males and 55,573 females. The average birthrate per 1,000 of population in

1901 was 29, as compared with 30.3 in 1891-1900, 32.3 in 1881-90, 35.5 in 1871-80, 35.4 in 1861-70 and 33.6 in 1851-60. There are in the city 1,033 females for every 1,000 males. Out of every 1,000 persons of marriageable age, 367 males and 372 females are unmarried. In 1900, 36,635 bachelors were married, 37,463 spinsters, 3,875 widowers and 3,047 widows. Of the total number of marriages 72 per cent took place in the Established Church, 16.8 per cent in the registry offices and 4.6 per cent in the Nonconformist churches. Of the 135,377 foreigners not naturalized British subjects, natives of Russia are the most numerous; Germany stands second, Russian Poland follows, France is fourth and Italy fifth. The Russians in London have increased since the last census from 12,034 to 38,117 —fully three-fold, that is—while Italy has doubled her contribution toward the population, now accounting for a round 10,000. The American invasion takes the form of 211 "actors."

History.—Though, by the evidence of its name and by archaeological remains, London was occupied by the Celtic Britons before the arrival of the Romans, it was not till the Roman era that it became a place of importance. There were probably two Roman Londons: the first destroyed by Boadicea and probably consisting of the area extending from near the Tower on the east by the course of the Langbourne (now preserved in Langbourne ward) on the north, by the course of the Walbrook on the west, and the Thames on the south; the second probably coincident with the mediæval walled city. The Roman walls were destroyed by the Danes and were restored by King Alfred. After the Romans left Britain, London assumed a certain amount of independence and throughout the Anglo-Saxon period it appears to have supported the monarch who was acceptable to the rest of the kingdom. Alfred was the first king of the Anglo-Saxons who thoroughly understood the importance of its military position. It suffered by fire in 764, 798, and 801. It was sacked by the Danes, who obtained a considerable settlement in Southwark and on the western boundary of the city beyond the Ludgate. At the Conquest London treated with and finally submitted to William. William's first act was to dominate the city by building his military stronghold, the beginnings of the Tower of London. He then granted the city its ancient rights by a charter, which is still preserved; on the accession of Henry I., a new charter was granted and the charter grants increased considerably under the Plantagenets, while its municipal privileges were made the standard for governing many of the municipal boroughs in the provinces. London sided with Stephen against Matilda, took part in the struggle against John for Magna Charta, was severely oppressed by Henry III., strongly supported Edward IV. and the Yorkish party in the wars of the Roses, and was faithful to Richard III.; it equipped and despatched ships to the navy collected to fight the Spanish Armada, and its citizens, officered by the aldermen of the city, fought for the Parliamentarian side against Charles I. Under the later Stuarts and the Georges it became more political than municipal and lost much of its "ancient

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power. In the reign of Henry II. the walls on both sides of the river are described in a contemporary account as supplied with numerous towers. London Bridge, erected instead of a wooden one, was begun in 1176 and finished in 1209. This was to a great extent the same that was taken down in 1832. In 1218 the forest of Middlesex was cleared, and that portion of London north of the city began to be built. In the year 1328 the village of Southwark was incorporated with the city, as it had previously served as a place of refuge for malefactors. In 1349 and 1361 London was visited by the plague. In 1381 broke out the rebellion of Wat Tyler, who fell by the hands of the lord-mayor, hence the dagger on the city arms. In 1416 street lamps were introduced; in the same century some of the principal streets were paved, and wooden houses began to be replaced by others of brick. In the next century improvements were continued, and Westminster was connected with the city by a row of noblemen's mansions along the river, the last of which, Northumberland House, has made way for the road leading from Trafalgar Square to the Embankment. In the 17th century, Spitalfields was covered with houses, and the space north of the Strand as far as Holborn, and from Temple Bar to St. Martin's Lane was extensively built on, as well as the neighborhoods of Charing Cross and Pall Mall. The New River was completed and many houses were supplied with water; sewers were dug; smooth pavements were laid down for passengers, and hackney coaches came into general use. But the streets were so narrow and dirty and the houses in so filthy a state that the city was scarcely ever exempt from the plague, which sometimes committed great ravages. In 1666 the great fire broke out and spread over 336 acres, destroying 13,200 houses, 90 churches, and many public buildings. In rebuilding, considerable improvements were introduced, and a fire in Southwark 10 years after gave a similar opportunity of improving that district. Population and trade now rapidly increased, partly from the immigration of French Protestants driven from their country by the revocation of the Edict of Nantes. In the 18th century London steadily advanced in extent, prosperity and splendor. In 1780 took place the Gordon riots, when the mob was in possession of London for two days and committed frightful havoc. Since that disgraceful outbreak the peace of London has never been seriously endangered, and the troops stationed in and around the capital, together with the effective police force that now exists seem quite adequate to ensure it against any similar disturbance. The extension and improvements which took place during the 19th century are greater than at any former period, and further changes of great importance are in operation. The most remarkable event of the century in the history of London was the carrying into effect in 1851 of the first great truly international industrial exhibition, which has since led to numerous exhibitions of a similar kind both there and abroad. In 1862 took place the second great international exhibition, and since that time various exhibitions of an international character and largely representing the colonies have been held in specially constructed buildings

at South Kensington. The history of London contains many episodes of vast importance to the nation as well as to London itself. As now united for government it will have to face problems of vast moment. The largest, most populous, and richest city that civilization has ever produced, the study of its history and its development must ever be of great importance and interest.

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London, Ohio, village, county-seat of Madison County; on the Pittsburg, C. C. & St. L. and the Cleveland, C. C. & St. L. R.R.'s; about 26 miles southwest of Columbus and 65 miles northeast of Cincinnati. It is situated in an agricultural region and its industries are mostly connected with farm products. The manufactures are agricultural implements, lumber, shoes, and cigars. It is the trade centre for a large part of the county and ships considerable farm products and live-stock. The village owns and operates the electric-light plant. Pop. (1900) 3,511.

London, Ontario, Canada, a city and port of entry, the county-seat of Middlesex County, on the Thames River, and on the Grand Trunk, the Canadian Pacific, and the Lake Erie & D. R. R.R.'s, 105 miles west of Toronto. London is a noted summer and health resort, its white sulphur springs attracting many invalids. It was settled in 1826 and is distinguished by having river, bridges, streets, parks, and buildings named after the principal similar features of the great British metropolis. The city has electric street railways, electric and gas lighting, a good water supply and is the seat of Huron College, Hellmuth College, Hellmuth Ladies College, a normal school, collegiate institute, three libraries, orphan asylum and convent, several hospitals, and cathedrals of the Catholic and Anglican faiths. London is in one of the finest agricultural districts of the Dominion, and has numerous iron foundries, machine-shops, mills, chemical works, boot and shoe factories, tanneries, breweries, printing offices, and oil refineries, the factories in 1898 employing 6,000 people with an output of \$8,726,170. Population with London Junction and Ealing suburbs 45,000, of city (1901) 37,981.

London Clay, in geology and palaeontology, a formation of the Lower Eocene Age; so called from its existing at or near London, England. It consists of a tenacious brown and bluish-gray clay, with layers of concretions called septaria. It has a maximum thickness of 600 to 700 feet. Under the city the thickness of the clay varies with the valley of the Thames as affected by the erosion which formed it.

London, Treaties and Conventions of. The following are the most important of the treaties and conventions concluded in London in modern times: The Quadruple Alliance, formed 2 Aug. 1718. On 6 July 1827, a treaty

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was signed between England, France, and Russia for regulating the affairs of Turkey and Greece, which led to the establishment of the Kingdom of Greece. On 22 April 1834, a quadruple alliance was formed between England, France, Spain, and Portugal against the claims of Don Carlos and Don Miguel to the crowns of Spain and Portugal. On 15 July 1840, a treaty was concluded between England, Russia, Austria, and Prussia to compel Mehemet Ali to restore Candia and Syria to the Porte; and on 27 November, at the conclusion of a short campaign by an Anglo-Austrian army in Syria, Mehemet Ali agreed to the terms of the treaty. A convention to close the Dardanelles against ships of war was signed on 13 July 1841; and a convention between France and England for suppression of the slave-trade, 29 May 1845. Austria, France, England, Prussia, Russia, and Sweden were parties to a treaty signed 8 May 1852, for settling the succession to the Danish crown, and guaranteeing the integrity of its dominions in relation to the duchies of Schleswig-Holstein. The rights of the German Confederation were reserved and the claims of the Duke of Augustenburg on the duchies relinquished on satisfaction. On 13 March 1871, at a conference of the great powers, the neutralization of the Black Sea, effected by the treaty of 1856, was abrogated. The neutralization of Luxembourg was guaranteed by the five powers at the conference of London, 11 May 1867. The Convention of London, which was concluded on 27 Feb. 1884, between the Transvaal and Great Britain, abrogated the Pretoria Convention of 3 Aug. 1881, and instead gave the Transvaal (thenceforward to be known as the South African Republic) independence in regard to its internal affairs, but reserved to the queen the right of veto over all treaties concluded "with any state or nation other than the Orange Free State," or "any native tribe to the eastward or the westward of the Republic."

London University, England, established as a joint-stock company in 1825, received in 1836 two charters, one for an association retaining the name of London University, and having power to examine candidates and grant degrees, and the other for a teaching body—the University College—entitling it to prepare students for the degrees conferred by the university. The object was to render academic honors accessible to all classes and denominations without distinction. The university became purely an examining body, granting degrees to all who passed the prescribed examinations, but not undertaking any teaching functions. An influential movement in favor of the establishment of a teaching university in the metropolis arose, however, and from 1888 commissions had the matter in hand, and in 1898 the London University Act was passed to give effect to their recommendations. A commission appointed to draw up statutes and regulations for the university in accordance with the act had its work formally ratified 29 June 1900, and the newly constituted university was established, the government granting the eastern and central portions of the Imperial Institute building to the university for its accommodation.

The eight faculties comprise arts, science, law, medicine, theology, music, engineering, and economics and political science, and the degrees

conferred are LL.D., LL.B., M.D., M.B., M.S., B.S., D.Sc., B.Sc., D.Lit., M.A., B.A., D.Mus., B.Mus. Candidates for any degree must first pass the matriculation examination, for which the subjects are Latin, English, mathematics, general elementary science, and one other subject selected from a prescribed list, including Greek, French, German, Sanskrit, Arabic, elementary mechanics, chemistry, sound, heat and light, magnetism and electricity and botany. For the ordinary degrees of B.A. and B.Sc. two other examinations must be taken. In the faculty of arts the highest degree is Doctor of Literature. Examinations are held at provincial centres as well as in London. The schools of the University, or institutions in which instruction is given, are: University College and King's College in all faculties; Hackney College, New College, Regent's Park College, Cheshunt College, Wesleyan College (Richmond), London College of Divinity in theology; Royal Holloway and Bedford Colleges in arts and science; the Royal College of Science; the South-Eastern Agricultural College, Wye; the medical schools of St. Bartholomew's, the London, St. Thomas's, St. George's, the Middlesex, St. Mary's, Charing Cross, and Westminster Hospitals, the London School of Medicine for Women; the Central Technical College of the City and Guilds Institute; and the London School of Economics and Political Science.

The supreme governing body is the Senate, consisting of the chancellor, 4 members appointed by the crown, 17 members elected by Convocation, 1 of them being the chairman of Convocation, 2 each elected by the Royal Colleges of Physicians and of Surgeons, 1 appointed by each of the four Inns of Court, and 2 by the Incorporated Law Society, 2 each chosen by University and King's Colleges, 1 representing the Corporation of London, 2 appointed by the London County Council, 1 representing the City and Guilds Institute, and 16 elected by the faculties. The Senate is debarred from imposing any religious test, or from imposing any disability on the ground of sex. There are three standing committees of the Senate, namely, the Academic Council, the Council for External Students, and a board to promote the extension of university teaching. The Chancellor, Vice-Chancellor, and Chairman of Convocation are *ex-officio* members of all three committees. Convocation consists of the Chancellor, the Vice-Chancellor, the members of the three standing committees, and the registered graduates of the university of prescribed standing. The parliamentary representative of the university is elected by the duly qualified male members of Convocation.

Lon'donderry, Charles William Stewart Vane, 3d MARQUIS OF, British military officer and diplomat: b. Dublin, Ireland, 18 May 1778; d. London 6 March 1854. He served under Sir John Moore and Sir A. Wellesley, in the Peninsula, distinguishing himself there at Talavera and other battles, and was English ambassador to Berlin in 1813. He was ambassador to Vienna the next year, and minister-plenipotentiary at its Congress in 1815. By his marriage with Miss Vane he succeeded to immense estates in the county of Durham, and devoted himself to their improvement and to the welfare of his tenantry. Under his original name of Stewart

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he wrote the 'History of the Peninsular War' (1808-13); 'Narrative of the War in Germany and France, 1813-4' (1830); and edited the 'Correspondence' of Viscount Castlereagh, his brother (1850).

Londonderry, Ireland, a city, seaport, county borough, and assize town, in the county of the same name, province of Ulster, on the Foyle, 23 miles from its mouth and 124 miles by rail north-northwest of Dublin. Waterside, a suburb on the opposite river bank, is united to the city by the iron Carlisle Bridge, 1,200 feet long. The houses of the town rise on the hill tier upon tier, while the summit is crowned by the cathedral. The ancient portion of the city is surrounded by a wall 1,708 yards long. It contains a small square, called the Diamond, from which four main streets diverge. The walls are pierced by seven gates, giving communication with other parts of the town, the greater part of which lies outside the walls. The most important public buildings are the guildhall, the county court-house, the post-office, the custom-house, the harbor offices, the jail, Gwyn's Institution, the model school, Magee College, Foyle College, St. Columb's College, the school of science and art, the lunatic asylum, and Ebrington Barracks. The harbor is commodious, and vessels of large tonnage can discharge at the quay, which extends for nearly two miles along the river, and is provided with a graving-dock. An extensive foreign, colonial, and coasting trade is carried on with English and Scotch ports, while Glasgow transatlantic steamers call three or four times a week at the mouth of the river. The principal export is agricultural produce; the chief imports are timber, grain, iron, coal, flax-seed, flour, and guano. Shirt factories employ thousands of workers, and there are timber-mills, grain-mills, foundries, coach-factories, bread and biscuit factories, distilleries, and a ship-building yard. Intermediate education is supplied by Foyle College, founded in 1617, and by St. Columb's Catholic College. Magee College opened in 1865, besides teaching secular subjects, has a theological course adapted to young men studying for the Presbyterian ministry. The Protestant cathedral is inferior to many parish churches in England. The Roman Catholic cathedral is a massive and magnificent structure, opened in 1873. The population is about equally divided into Roman Catholics and Protestants. Derry originated in a monastic establishment founded by St. Columba in the 6th century. It remained an ecclesiastical settlement until 1566, when it was occupied by the English in their wars with the O'Neills of Ulster. In 1608 the place was burned and the English governor slain by Sir Cahir O'Dogherty, one of the Irish chiefs of Donegal. During the 20 years that followed, the corporation of London, who obtained a grant of the place from James I., rebuilt the city, surrounded it with a wall, fortified it with cannon, and gave it a new name. Henceforth it was known as Londonderry. Here the Protestants of Ulster took refuge at the revolution, and held the fortress against the forces of James II., the siege lasting from April till August 1689; the defense by untrained men against superior numbers being regarded as one of the most heroic and successful military actions of modern times. Pop. (1901) 39,873.

Lone Star State, The, a name given to Texas from the device on its coat of arms: one star, or a "lone star" in the centre of a wreath.

Lone Wolf (GUIPAGO), Indian chieftain of the Kiowa tribe: d. 1870. He became head chief of his tribe in 1866. He refused to bring the tribe into a reservation, in accordance with the Medicine Lodge treaty, until compelled to do so by General Custer in 1869. However, he continued to maintain an attitude of defiance, and finally headed the hostile portion of his tribe in the southern outbreak of 1874. The outbreak was finally quelled by General Mackenzie; Lone Wolf, with the other chiefs, surrendered, and in 1875-8 was held prisoner at Fort Marion, Fla.

Long, Charles Chaillé, American soldier: b. Princess Anne, Somerset County, Md., 2 July 1842. He served in the Union army in the Civil War and attained the rank of captain. In 1869 he was appointed lieutenant-colonel in the Egyptian army; in 1874 was made chief of staff to General Gordon, and employed on a diplomatic and geographical mission to the interior of Africa. Returning in 1877 to the United States, he studied at the Columbia Law School, and was admitted to the bar. He was appointed consul-general in Korea in 1887. He is the author of: 'Central Africa' (1876); 'The Three Prophets — Chinese Gordon, the Mahdi, and Arabi Pasha' (1884).

Long, Crawford W., American physician: b. Danielsonville, Madison County, Ga., 1 Nov. 1815; d. Athens, Ga., 16 June 1878. He was graduated from Franklin College, Pa., in 1835, and from the Medical School of the University of Pennsylvania in 1839, and after practising a short time in Jefferson, Ga., removed to Athens, Ga., in 1851. He claimed to have performed on 30 March 1842 the first surgical operation ever made while the patient was unconscious from inhaling ether. This appears to have been done in accordance with careful reasoning upon the subject, but although he repeated the experiment successfully in three other cases not far from that time the facts did not then become generally known. In December 1844 Dr. Horace Wells in Boston demonstrated practically the principle of anaesthesia by the use of nitrous-oxide gas, and in 1846 W. T. G. Morton followed him in a similar discovery, and publicly demonstrated the feasibility of employing anaesthetics in surgical operations. In 1902 the Georgia Medical Association proposed to place a statue of Long in the National Capitol as the discoverer of anaesthesia. See ANAESTHESIA.

Long, Eli, American general: b. Woodford County, Ky., 16 June 1837; d. New York 1903. He was graduated from the military academy at Frankfort, Ky., in 1855, and received an appointment as 2d lieutenant in the 1st United States cavalry, serving in the Cheyenne expedition in 1857. During the Civil War he was in active service in the Federal army, was several times wounded, and was brevetted brigadier-general of volunteers in August 1864. He captured Selma, Ala., in April 1865. He was mustered out of the volunteer service in 1866 and retired as major-general. For many years previous to his death he had lived in Plainfield, N. J.

LONG—LONG ISLAND

Long, George, English classical scholar: b. Poulton, Lancashire, 1800; d. 10 Aug. 1879. He was educated at Cambridge and was professor of classical literature in the Brighton Proprietary College 1849–71. He was famous for his thorough knowledge of Latin and Greek literature. He published admirable translations of ‘Thoughts of the Emperor M. Aurelius Antoninus’ (1862–79) and ‘Discourses of Epictetus’ (1877); as well as editions of Cæsar, Sallust and Cicero.

Long, John Davis, American lawyer and politician: b. Buckfield, Oxford County, Maine, 27 Oct. 1838. He was graduated from Harvard in 1857; taught in Westford Academy for two years; then studied law at Harvard law school and was admitted to the bar in 1861. He built up a large practice and became senior member of his firm, Long & Hemenway. He has been an active member of the Republican party; served in the Massachusetts legislature 1875–8, being speaker of the House from 1876–8, and was elected lieutenant-governor of the State in 1879; the next year he was elected governor, and re-elected in 1881. He was also for several years on the state house construction commission of the State. In 1883 he was elected to Congress, serving there till 1889; he was then a candidate for the Senate but was defeated, and did not hold public office till appointed secretary of the navy by President McKinley in 1897. He held this office through the Spanish War, conducting its affairs with marked ability, and resigned in March 1902. He published in 1879 a translation of the ‘Æneid’ of Virgil.

Long, Stephen Harriman, American engineer: b. Hopkinton, N. H., 30 Dec. 1784; d. Alton, Ill., 4 Sept. 1864. He was graduated at Dartmouth College in 1809, and after teaching school entered the United States engineer corps in 1814. He taught mathematics at West Point 1814–16, and was subsequently engaged for several years in surveys of the country west of the Mississippi River, as well as of the Upper Mississippi. Long’s Peak in the Rocky Mountains was named in his honor. When the construction of the Baltimore & Ohio railroad was commenced in 1827 Long became chief engineer of surveys and introduced many improvements in wooden bridges, to adapt them for railroad purposes. In the construction of railroads he established a system of curves in locating roads. He served for some years on the board for the improvement of the Mississippi, and in 1856 was placed in charge of that work. He was appointed colonel of engineers in 1863, retiring the same year.

Long, William Joseph, American Congregational clergyman and author: b. North Attleboro, Mass., 3 April 1867. He was graduated from Harvard in 1892 and from the Andover Theological Seminary in 1895. He is the author of: ‘The Making of Zimri Bunker’ (1898); ‘Ways of Wood Folk’ (1899); ‘Wilderness Ways’ (1900); ‘Beasts of the Field’ (1901); ‘Fowls of the Air’ (1901); ‘Secrets of the Woods’ (1901); ‘School of the Woods’ (1902); ‘Following the Deer’ (1903); ‘A Little Brother to the Bear’ (1903).

Long Branch, N. J., city, in Monmouth County; on the Atlantic Ocean, and on the

Pennsylvania, the New Jersey S., and the Central of New Jersey R.R.’s; about 35 miles by water, 45 miles by rail, and 30 miles in direct line south of New York city. During the summer season steamers run regularly several times a day between New York and Long Branch, and electric lines connect the nearby cities and towns with this famous summer resort. Long Branch is made up of large hotels, boarding houses, cottages, bathing houses, parks, stores, and places of amusement. It is well prepared to take care of the thousands of people who visit the place in the hot summer months. It has 16 churches, the Star of the Sea Academy, public schools, the Monmouth Memorial Hospital, a circulating library, and public reading rooms. The avenue along the bluff is a favorite walk. The long beach affords excellent bathing facilities. Large bulkheads have been erected to prevent destructions of the bluff by the action of the waves. The government is vested in a commission composed of seven members, who choose the mayor from among the number. Four of the commissioners are elected by wards, three at large, and all are elected annually. There are three banks with a combined capital of \$200,000.

Long Branch is one of the oldest summer resorts in the United States. As early as 1670 settlements had been made along the coast. Colonel White of the British army, who owned the land where Long Branch is located and in the vicinity, about 1770, used to spend his summer months at this place. After the Revolution people from Philadelphia began to visit the place during the hot months, and in the last of the 18th century it had quite a reputation as a summer resort. Prior to its occupancy during the summer by people from New York and Philadelphia, it was frequented by fishermen and wreckers. Its proximity to New York, Philadelphia, and other cities gives it a large number of guests during the season. Pop. (1900) 8,872.

CHAS. L. EDMONDS,
Editor of Long Branch ‘Record.’

Long Island, New York, the southeastern-most portion of the State, connected by three bridges and several ferries across East River with Manhattan Island; is bounded on the north by Long Island Sound (q.v.), separating it mainly from the south shore of Connecticut. The Atlantic Ocean bounds it on the east and south, while The Narrows, New York Bay, and East River, already mentioned, connecting the ocean with the Sound, complete the boundaries on the west and northwest. Several small islands around the coasts are included in its political boundaries, the best known being Coney, Rikers, Berrian, South Brother, Fire, Barren, Shelter, Gardiner, Fisher, and Plum. Long Island has a maximum length of about 120 miles, varies in width from 12 to 23 miles, and has an area of 1682 square miles. It is divided into four counties, Nassau, Suffolk, Queens, and Kings, the last two metropolitan boroughs of New York city, occupying a considerable portion of the western end of the island. Queens County embraces the populous centres of Long Island City (q.v.), Maspeth, Corona, Flushing, Jamaica, Woodhaven, and Far Rockaway, while the boundaries of Kings County are those also of the former city, now the metropolitan borough, of Brooklyn (q.v.).

LONG ISLAND

The 280 miles of coast line are indented with numerous bays and inlets. A deep bay, 30 miles long, divided into Great and Little Peconic, and Gardiner's bays, splits the eastern end of the island into two long narrow peninsulas, the southern terminating at Montauk Point, and the northern at Orient Point, with Plum and Fishers islands extending beyond. Great South Bay, from two to five miles broad, extends along the southern coast for nearly half the length; it is separated from the Atlantic Ocean by Fire Island or Great South Beach, a sandy strip from a quarter of a mile to one mile wide, communicating with the ocean by several openings. Jamaica Bay is on the south coast also, New York Bay on the west, while along the north coast are Flushing, Little Neck, Manhasset, Hempstead, Oyster, Huntington and Smithtown bays. A government system of lighthouses, life-saving stations, fortifications, and masked batteries extends around the coast.

The level seacoast of the south side, with its extended views of bay and the broad ocean, contrasts sharply with the hilly north side and its deep indentations, looking out upon the land-locked Sound. The rolling stretches of Montauk Point and Shelter Island afford another contrast to the many square miles of scrub oak and level sandy plains in the centre of the island. The island reaches a height of over 380 feet in West Hill, Suffolk County, and in Harbor Hill at Roslyn, the loftiest points in the range of glacial hills that extends along the northern coast. The island is well watered by several small streams, the Peconic, 15 miles long, flowing into Great Peconic Bay, being the largest. Natural ponds or lakes abound, and there are about 116 square miles of salt marsh throughout the island. The eastern portion especially is well wooded and noted for its pine forests well stocked with deer and other game. Like other insular positions the climate is milder than that of the adjacent continent, the average temperature being several degrees below that of the metropolis, while the hottest days are tempered by cool and refreshing breezes from ocean or Sound. The soil generally is productive and under a high state of cultivation. In the southern flat lands it is of a light, sandy nature, well calculated for raising grain, especially Indian corn; in the hilly north the soil is strong and adapted to the culture of grain, hay, and fruits. Market gardening for metropolitan demands constitutes the principal portion of the agricultural industry of Kings and Queens counties. Oyster, clam, and other fisheries are important sources of food supply.

The Long Island and other railroads give easy access from New York city to the remotest parts, Montauk Point, the southeasternmost point, being only three hours away. Long Island is noted especially for exceptional opportunities, embracing all sorts of summer recreation. The roadways are admirably adapted to all forms of locomotion, and riding, driving, automobiling, and wheeling, are equally desirable methods for enjoying the region. In the numerous villages and towns along Jamaica Bay, Great South Bay, Peconic Bay and the Sound there are ample facilities for sailing, rowing, fishing, and bathing, which are fully utilized. For golfing, lawn tennis, and all other forms of outdoor sport and recreation, every possible fa-

cility is found, and the golf courses, especially at Garden City and Shinnecock, are notable. The chief seaside resorts along the south coast are Bath Beach, Bensonhurst, Coney Island, Brighton, Manhattan, Rockaway Beach, Far Rockaway, Long Beach, Fire Island, Patchogue, and Montauk Point; along the north coast are Greenport, Port Jefferson, Coldspring Harbor, Oyster Bay, Glen Cove, Seaciff, College Point and North Beach. The population of Long Island in 1900 was 1,452,611, 1,166,582 of this number residing in Brooklyn borough.

When discovered in 1609 by Hudson, Long Island was inhabited by 13 tribes of Algonquin Indians, by whom the island was variously called Panmancke, Wamponomon, Mautowacks, and Sewanlackey. A few descendants mixed with negro blood, and retaining no knowledge of their ancient language, dwell near Montauk Point and Shinnecock Neck. French Protestants from near the river Waal, in the Netherlands, made the first settlement in 1625 under Dutch protection, and immigrants from New England established themselves in different localities shortly afterward. Lange Eylan, the Dutch name, was changed by the colonial legislature to that of Nassau, a name which survives in one of the counties, but was never adopted by the people for the island. Long Island was a busy base of military movements during the Revolutionary War, and the Battle of Long Island (q.v.) is the principal event in its history.

Long Island, Battle of, one of the early American defeats in the Revolutionary War, was fought 27 Aug. 1776, in Brooklyn, N. Y., mainly within the present limits of Prospect Park, the column in Battle Pass to the memory of the 400 Maryland troops who fell in the battle, and the foundation remains of the redoubt on Lookout Hill, marking the central point of defense and attack. After the evacuation of Boston by the British, Washington made strenuous efforts to fortify New York and its approaches. General Greene, in command of a considerable body of troops, mostly raw recruits, was entrusted with the defense of Long Island, and constructed a line of intrenchments and redoubts from Wallabout Bay to Gowanus Cove. The main works at the Wallabout end were on the hill afterward known as Fort Greene, now marked by Washington Park. At Gowanus Cove, a battery was erected at Red Hook, and a fort on Governor's Island, nearly opposite. About two and a half miles from the intrenchments, between them and the southwest side of the island, the range of low hills in this section was then densely wooded and crossed by three roads; one on the right of the works passing near the Narrows to Gravesend Bay, the central one through Flatbush, and the third far to the left through Bedford to Jamaica. In the midst of his preparations, General Greene fell ill, and the command devolved upon General Sullivan, then just returned from Lake Champlain. Unacquainted with the ground and with Greene's plans the change of command caused considerable confusion. Nine thousand British troops landed in Gravesend Bay on 22 August without resistance; they were commanded by Sir Henry Clinton, assisted by Lords Cornwallis and Percy, General Grant and Sir William Erskine. Lord Cornwallis, rapidly advancing to the central pass, found it occupied by the rifle regiment of Colonel Hand, and without risking

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an encounter, took up a position at Flatbush. Washington inspected the American lines on the 24th, and placed General Putnam in command. The following day the British were reinforced by two brigades of Hessian troops, under General De Heister, and on the 26th began to carry out their plan of operations. The road through Bedford to Jamaica unfortunately had been comparatively neglected by the Americans, and eluding the patrol, the British contingent under General Clinton, accompanied by General Howe, the commander-in-chief, and by Lords Percy and Cornwallis, guided by a local tory, gained possession of the road and neighboring heights undiscovered during the night of 26-7 August. In the morning, General Grant, with the left wing of the British army, advanced along the road by Gravesend and the Narrows, and was resisted by Colonel Atlee with a guard of Pennsylvania and New York militia, who retired fighting until he had fallen back upon General William Alexander (Lord Stirling), whose two regiments had hastened to his assistance. Here active firing was kept up by both sides without an attempt at a general action. At the same time, as diversions, De Heister opened up a cannonade from Flatbush upon Colonel Hand and his riflemen, while the guns of the British war-vessels were trained upon the Red Hook battery. Meanwhile on the right Clinton opened his guns upon the Americans, and at this signal De Heister advanced to storm the central pass and the redoubt of which General Sullivan had taken command. The latter, who found his left flank engaged and himself in danger of being surrounded, ordered a retreat, but not soon enough to escape the British light infantry, who drove him back upon De Heister and his Hessians. The Americans fought with desperate valor, a large body cutting their way through the intrenchments, the rest who were not killed either escaping among the hills or surrendering as prisoners, among the latter being General Sullivan. On the left Colonel Atlee and Lord Stirling, who had maintained their position in front of General Grant, found themselves cut off by Cornwallis. They gallantly attacked the enemy with such determination that the British held their ground only by the assistance of reinforcements, when Stirling seeing the uselessness of further resistance surrendered. Having forced all the approaches the British proceeded to invest the American works.

Washington arrived in the evening and took command, the following day bringing over additional troops. But with the formidable British force opposed to him, and indications that the British fleet intended moving up the river so as to cut the force in Brooklyn entirely off, Washington, on the night of 29-30, favored by a thick mist, made a strategic and masterly retreat to Manhattan, greatly to the discomfiture of the British, who were unaware of the movement until some time after the last American had crossed in safety. The Americans lost over 900 men in the battle, while the British loss in killed wounded and missing was 400. Consult: Carrington, 'Battles of the American Revolution' (1876); Dawson, 'Battles of the United States' (1858); Field, 'Battle of Long Island' (1869).

Long Island City, N. Y., formerly a city in Queens County, and second in size on Long Island, now in the borough of Queens, in New

York city. It became a part of New York 1 Jan. 1898. As early as 1640 Dutch settlers had taken possession of the land in this vicinity, and gradually a number of little villages were formed on the western end of the island, on the East River and the Sound. In 1870 a number of the little villages, Astoria, Blissville, Dutch Kills, Hunter's Point, Middletown, Ravenswood, and Steinway, were united into one municipality and called Long Island City. Newtown Creek separates this section from the borough of Brooklyn. Ferries connect it with the borough of Manhattan. It has extensive manufacturing interests, several hospitals, a large number of churches, and schools. Consult: Kelsey, 'History of Long Island City.'

Long Island Sound, a body of water which separates Long Island, in New York State, from the mainland. It is an arm of the Atlantic Ocean, extending northeast and southwest; about 110 miles long and from 10 to 25 miles wide. It is connected with the Atlantic on the east by The Race, a narrow passage south of Fishers Island; and on the west by a strait called the East River, which enters New York Bay and through the Narrows to the ocean. The coast on the north is irregular, and has a number of small bays and capes. The south or Long Island coast is irregular from East River to near Port Jefferson; and from Port Jefferson to Orient Point the coast line has few indentations. The largest indentations on the north side are New Haven Harbor and Pelham Bay. There are several good harbors at the mouths of rivers and in places sheltered by small islands. On the south shore the principal indentations are Smithtown, Northport, Oyster, Manhasset, Little Neck, and Flushing bays. The north coast is fringed by small rocky islands or reefs. In the western part of the Sound there are a number of small islands, which have been improved so as to be desirable resorts or residential locations. Chief among these are Glen Island and City Island. At the entrance to East River there are a number of islands used chiefly by the health department of New York city. At the east entrance is a group of islands which extend diagonally from Long Island to the State of Rhode Island. The largest of this group is Fishers Island. (See NEW YORK CITY.) The chief rivers which flow into the Sound, all from the north, are Connecticut, Mystic, Thames, and Housatonic.

Since the improvements made (1865) at Hell Gate (q.v.), Long Island Sound is an available route for ocean steamers. The large passenger steamers which ply daily between New York and New England ports pass through the Sound. A large number of forts with modern equipment are located along the shores, thus guarding most carefully the entrance to New York city by this route.

Long Parliament, in English history, a Parliament summoned by Charles I. in 1640. Largely liberal and anti-royal, thanks to the campaigning efforts of John Pym, it declared ship-money illegal, claimed the right of taxation as belonging solely to the Commons and not to the Crown, passed the Triennial Bill, and, attacking the King's favorites put Laud in prison and Strafford to death. In November 1641, passing successfully a reactionary crisis, it adopted the Great Remonstrance, and in January

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of the next year refused to obey the king's order to surrender "the five members," its leaders, Hampden, Pym, Hollis, Haselrigg and Strode. Thus it brought on the Civil War, through which it continued in power, losing however many members upon the introduction of Presbyterianism, and nearly 100 Presbyterians in 1648 after its attempted compromise with the king, which aroused the anger of the Parliamentary army. The handful of members left composed the "Rump," which was nominally in power until dissolved in 1653 by Cromwell, after whose death it briefly reconvened in 1659 and 1660. See CROMWELL.

Long-tailed Duck. See OLD SQUAW.

Long Tom. (1) the name given a 42-pound gun captured by the British in 1798 from the French battleship Hoche. It was afterward purchased by the Americans and used in the attack on Haiti by the French in 1804, and remained idle till 1812, when it was placed on the General Armstrong. This vessel ran the British blockade at New Orleans 9 Sept. 1814, and put into the bay near Horta, Fayal, being disabled in an encounter with a British squadron. Here the gun was dismantled and remained till Colonel Reid, son of the commander of the General Armstrong, had it brought back to New York 18 April 1893. (2) An apparatus for washing gold from the earth or gravel in which it is found. It consists of a wooden trough, from 12 to 25 feet long and about a foot wide. At its lower end it widens, and its floor there is of sheet-iron pierced with holes half an inch in diameter, under which is placed a flat box a couple of inches deep. A stream of water is kept running through it by means of a hose; the dirt is shoveled in, and stirred at the lower end, where the earth and gravel fall through the sieve into another box, where they are again sifted. The machine, like the "rocker," was cheap and wasteful; and both were soon displaced by the sluice.

Long'acre, James Barton, American engraver: b. Delaware County, Pa., 11 Aug. 1794; d. Philadelphia 1 Jan. 1869. He was apprenticed in Philadelphia, and in 1819-31 was employed in the illustration of many of the foremost American works then published. At first with James Herring, and later independently, he published the "National Portrait Gallery of Distinguished Americans" (1834-9), many of whose engravings were from sketches by himself. In 1844 he was appointed engraver to the United States mint, and from that time until his death designed all new coins. He also remodeled the coinage of Chile.

Lon'gan, a tree and its fruit. See LITCHI.

Longard de Longgarde, Dorothea. See GERARD DOROTHEA.

Longchamps, lōn-shōn, Paris, France, a celebrated racecourse on the southwest side of the Bois de Boulogne, where the race for the "Grand Prix" is run. Prior to its suppression in 1792, part of the site was occupied by the Convent of Longchamps, founded in 1260, a not too rigid retreat for ladies of the higher classes. It was a popular resort for carriage driving, especially during the week preceding Easter.

Longe, a local name (Vermont) for the lake trout (q.v.).

Longevity, lōn-jēv'i-ti. The duration of life varies greatly in the same group of plants and animals, and great age in animals is by no means confined to the few higher vertebrates, such as the elephant, crocodile or parrot. Even so lowly an organism as the sea-anemone has been kept alive for 55 years. Low herbaceous annual plants in the temperate zone, have co-species in the tropics which grow to be trees and are perennial. Not only are individuals of a species long-lived, but certain species and genera exhibit wonderful vitality and have persisted throughout many geological ages, such are *Lingulella*, *Limulus*, *Ceratodus*, and certain foraminifers which have persisted since the Silurian period.

Causes of Longevity.—They have to do with the nature of the physical surroundings, and also depend on slow growth and late reproduction. Botanists find that great age in plants is dependent on slow growth, gradual propagation carried on late in life, on the solidity and hardness of the tissues, etc. Examples of great age in plants are the Sequoias or "big trees" of California, which are supposed to be over 3,000 years old; in fact, they are survivors of Tertiary times, since they occur in a fossil state in the polar regions in British Columbia and in Europe.

The longevity of certain species of animals has been attributed by Weismann to favorable environment, including temperature. He considers that the duration of life depends first upon the length of time which is required for the animal to mature, and upon the length of the period of fertility, the latter point being determined by external conditions. Undoubtedly another factor is heredity, since longevity is directly transmissible from parent to offspring, and great age runs in families.

As to longevity in the lower animals little is known. As a rule, they live but a few weeks, months, or years. The crayfish is said to attain an age of 20 years, and possibly the lobster may live to be as old as that. Lampreys preserved in Roman fishponds are said to have lived to be nearly 60. The crocodile, which never stops growing through life, lives 100 years. Pike and carp reach the age of 150 years. A gigantic salamander of Japan lived at least 52 years in confinement in Germany. As to the age of birds a writer in the British ornithological journal "Ibis," states that the following records of birds in captivity are authentic: raven 50, gray parrot 40 and 50, blue macaw 64, eagle-owls 53, and one was then still alive at 68 years. Certain aquatic birds are very long-lived, as a heron of 60, goose 80, mute swan 70. A goose still living in Rhode Island in 1903 is known to be 50 years of age. To what age in free nature these birds may reach is unknown. The elephant is known to live a century and the whale is supposed to be equally long-lived. The horse rarely reaches the age of 40, though according to Lawrence "Old Billy" of Manchester was known to have lived 59 years, and died at the age of 61, while Albertus, an old veterinarian, writes that he knew a soldier actually serving upon a horse which was 70 years of age.

Man sometimes reaches the age of 100 years, and in rare instances even exceeds that age; while heredity undoubtedly has most to do with great age, it may be promoted in those of medium height by quiet, regular habits, moderation in eating and abstention from or moderation in

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the use of stimulants and tobacco. Women attain a greater age than men. To show that in man the mean duration of life may be extended by good sanitation and improvement in the general conditions of life, the mean duration of life in France has risen from 29 years at the close of the 18th century to 40 years. The United States census report for 1900 on deaths that occurred in 271 cities of 5,000 population or more shows that 18.6 persons died in 1900 out of every 1,000, whereas in 1890 the number who died in the same cities was 21 out of every 1,000. The average age at death in 1890 was 31.1 years; in 1900 it was 35.2 years. If these statistics be accurate the saving of human life that has been achieved in a decade is enormous. Consult: Weismann, 'Essays upon Heredity, etc.' (Oxford 1889); Lankester, 'On Comparative Longevity in Man and the Lower Animals' (London 1870); Lolaville, 'The Duration of Human Life,' in the 'Popular Science Monthly,' Vol. XX., November 1881.

Longfellow, Ernest Wadsworth, American artist: b. Cambridge, Mass., 1845. He studied under Couture in Paris, and among paintings by him may be named: 'Italian Pines'; 'Misty Morning'; 'John and Priscilla'; 'Old Mill at Manchester'; and a portrait of his father, Henry W. Longfellow, the poet.

Longfellow, Henry Wadsworth, American poet: b. Portland, Maine, 27 Feb. 1807; d. Cambridge, Mass., 24 March 1882. His father, Stephen Longfellow, was a prominent and cultured lawyer of Portland, having graduated from Harvard College, with Dr. Channing and Joseph Story, in 1798. He married Zilpah Wadsworth, daughter of Gen. Peleg Wadsworth, who fought in the Revolution, in 1804. The poet's mother was singularly imaginative and sympathetic, and fond of poetry and music. Henry was the second of four sons and of eight children. At 15 he entered the sophomore class at Bowdoin College, and discovered much taste for literature, and unusual facility in verse. After his graduation in 1825, he was selected as the most promising candidate for the newly established professorship of modern languages at Bowdoin, and was sent to Europe to prepare for the work. He traveled and studied in France, Spain, Italy, and Germany, and acquired considerable linguistic knowledge in the three years of his stay. In 1829 he returned and took up his duties, which were onerous, involving the preparation of elementary text-books in French and Spanish. In 1831 he married Mary Storer Potter, daughter of Judge Barrett Potter, and a schoolmate of earlier years. He wrote for the 'North American Review,' and began to contribute to the 'New England Magazine' some of the papers from the 'Sketch Book of Scenes in France, Spain, and Italy,' which he had prepared abroad. These were collected and issued as the two parts of 'Outre-Mer' in 1835. Two years earlier he had published his translation of 'Coplas de Manrique,' prefaced by his article from the 'North American Review' on 'The Moral and Religious Poetry of Spain.' This little book attracted the attention of George Ticknor, then about to resign the professorship of modern languages in Harvard College, and seems to have had much to do with making its author his successor. The position was tendered

and accepted, and Longfellow sailed, accompanied by his wife, in the spring of 1835, for a year of further study abroad. By way of London, where they met the Carlyles and other literary people of note, they went to Copenhagen and Stockholm, for study of the Scandinavian languages, which detained them till the close of the year. In December, on their way to the south, Mrs. Longfellow died at Rotterdam. Longfellow spent the winter and spring at Heidelberg, finishing the year in Switzerland and the Tyrol. He began his work at Cambridge in December 1836, taking lodgings at Cragie House, where Washington had his headquarters in the first year of the Revolution. In 1839 appeared 'Hyperion,' containing, in a somewhat sentimental vein, the cherished thoughts and impressions of his stay in the Tyrol and Switzerland, and also 'Voices of the Night,' his first volume of verse. The latter work was conspicuously successful, and did much to strengthen the influences that were drawing him away from teaching and from prose tasks. After two years of further service, he was forced, by the state of his health, to ask for a leave of absence, and in the spring of 1842 sailed again for Europe, returning somewhat benefited late in the year. He employed his time, during the return voyage, upon a series of 'Poems on Slavery,' which was at once published, and led to some unkindly criticism. In 1843 Longfellow married Frances Elizabeth Appleton, daughter of Nathan Appleton, a Boston merchant. This year he published 'The Spanish Student,' a drama in three acts, and in 1845 his 'Poets and Poetry of Europe,' as also, in 1846, 'The Belfry of Bruges, and other Poems.' This was followed in 1847, on a theme suggested by Hawthorne, by the famous 'Evangeline.' Two years later he produced 'Kavanagh,' a somewhat artificial story of New England life, and in 1850 'The Seaside and the Fireside,' which was followed the next year by 'The Golden Legend.' In 1854 Longfellow gave up the cares of his professorship, that he might write, and at once began serious work upon his long-delayed translation of Dante, and on an Indian poem that he had not yet named. This latter, eventually called 'Hiawatha,' was finished near the close of the year. In 1858 appeared 'The Courtship of Miles Standish,' which showed increased skill in the handling of hexameters, and was very favorably received. In July 1861 Mrs. Longfellow died from injuries caused by the burning of her gown, ignited by a dropped match. After two years, 'Tales of a Wayside Inn' appeared, and in 1867 'Flower-de-Luce,' and the first part of 'Dante's Divine Comedy.' This translation was fully published in 1870. In 1868 'The New England Tragedies' was finished. This year, with a family party, Longfellow sailed for England, receiving everywhere the honors of the country, and in special the degrees of LL.D. from Cambridge and D.C.L. from Oxford. The party traveled through Switzerland to Italy, returning to America by way of Scotland in September of the next year. Longfellow began work again industriously, bringing out 'The Divine Tragedy' in 1871, and 'Christus,' and 'Three Books of Song' in 1872. In 1874 appeared 'Aftermath,' and the year after 'The Masque of Pandora and other Poems.' In 1876 was published the first number

LONGFELLOW—LONGINUS

of 'Poems of Places,' which ran up to 31 eighteenmo volumes, and occupied three years in the editing. He had twice essayed similar collections, 'The Waif' (1845), and 'The Estray' (1846), many years before. In 1878 he published 'Kéramos, and other Poems,' and in 1880, 'Ultima Thule.' In October of 1881 he was seized with vertigo, followed by nervous prostration, which stopped all further work, and in March of the next year he succumbed to an attack of peritonitis of less than a week's duration. He was a man of an impressionable and sprightly nature, and of great sweetness and purity of life, knowing neither enemies nor rivals. His genius was essentially lyrical, and his refined facility in literature gave him his capital rather than his powers of analysis and of thought. He is the first of American and perhaps of modern English poets in popularity and a hundred translations from his work have been made in eighteen leading languages of the world. Consult: S. Longfellow, 'Life of Henry W. Longfellow' (1886); and 'Final Memorials of Henry W. Longfellow' (1887); Robertson, 'Longfellow' (1887); Wendell, 'Literary History of America' (1900); Carpenter, 'Henry Wadsworth Longfellow' (1901); Higginson, 'Longfellow' in 'American Men of Letters' series (1902).

L. A. SHERMAN,
Of the University of Nebraska.

Longfellow, Samuel, American Unitarian clergyman and poet: b. Portland, Maine, 18 June 1819; d. Cape Elizabeth, Maine, 3 Oct. 1892. He was a younger brother of H. W. Longfellow, and was graduated from Harvard in 1839 and from Harvard Divinity School in 1846. After his ordination to the ministry he was pastor of the Unitarian Church at Fall River, Mass., 1848-51; of the 2d Unitarian Church in Brooklyn, L. I., 1853-60; and of the Unitarian Church at Germantown, Philadelphia, 1877-82. His remaining years were spent in Cambridge. His fame as a poet has been overshadowed by that of his brother, but he had a very distinct poetic gift, and his hymns, of which he wrote many, are among the best of modern religious lyrics and are found in hymnals of many denominations. He possessed a gentle, unaggressive nature, but held his convictions firmly, nevertheless, and was fearless in the expression of his religious and poetical opinions, his views being more often radical than conservative. His published works include: 'A Book of Hymns,' with S. Johnson (1846), a compilation revised in 1864 as 'Hymns of the Spirit'; 'Thalatta: a Book for the Seaside,' with T. W. Higginson (1853), a verse compilation partly original; 'Life of Henry Wadsworth Longfellow' (1880); 'Final Memorials of Henry Wadsworth Longfellow' (1887); 'Essays and Sermons' (1894); 'Hymns and Verses' (1894). Consult: May, 'Memoir and Letters of Samuel Longfellow' (1894).

Longfellow, William Pitt Preble, American architect: b. Portland, Maine, 25 Oct. 1836. He is a nephew of Henry W. Longfellow (q.v.), and was graduated from Harvard in 1855. He was assistant architect of the Treasury Department 1869-72; is a fellow of the American Society of Architects, and was the original editor of 'The American Architect.' He was chairman of the architectural section of

the Board of Judges of the World's Columbian Exposition, 1893. He has published: 'Abstract of Letters on Perspective' (1889); 'Cyclopedia of Architecture in Italy, Greece and the Levant' (1895), a work of great value; 'The Column and the Arch' (1899); 'Architectural Essays.'

Long'fin, a large and important sea-fish (*Chilodactylus macropterus*) about the Cape of Good Hope. It represents a family, having several other food-fishes of value in the Indian Ocean and Australian seas, all characterized by elongation of one of the rays of each pectoral fin.

Longhena, Baldassare, bäl-däs-sä'rä löng'na, Italian architect: b. Venice about 1604; d. there 1682. He carried to its highest pitch the Venetian baroque, in which he followed to some extent his predecessors Palladio and Scamozzi. In the plastic accessories of his buildings he was far less original. He built in 1631-56 the great church of Santa Maria della Salute (commonly called "The Salute"), an octagonal structure with two domes. The churches of Santa Giustina, San Tomà, and Santa Maria ai Scalzi; the Palazzo Rezzonico and the staircase of the cloister of San Giorgio Maggiore were also his work.

Longhi, Giuseppe, joo-sép'pé löng'gē, Italian engraver and painter: b. Monza 13 Oct. 1766; d. Milan 2 Jan. 1831. He studied line-engraving in the school of Vangelisti at Milan, was for a time at Rome, but later established himself at Milan, where he was a professor in the Academy from 1798. He was unexcelled among contemporary engravers in excellence of portraiture. Among his plates are: 'Bonaparte' after Gros; 'The Philosopher' after Rembrandt; 'The Vision of Ezekiel' after Raphael; 'Washington' after Stuart; 'Eugène Beauharnais' after Gérard; and 'The Emperor Franz I.' after Schiavoni. He published 'Teoria della Calcografia' (1830), once well known.

Longicornes, lön-jí-kör'nëz, or **Long-horned Beetles**. See CERAMBYCIDÆ.

Longino, Andrew Houston, American lawyer: b. Lawrence County, Miss., 16 May 1855. He was graduated from Mississippi College, Clinton, Miss., in 1876 and until 1880 was clerk of the circuit and chancery courts for Lawrence County. He was elected to the State senate in 1880 and in the following year was admitted to the bar. He served until 1884 in the State senate and was appointed district attorney for southern Mississippi and in 1894 became chancellor. He was elected governor of Mississippi for a term of four years in 1900.

Longinus, Cassius, Athenian Neoplatonic philosopher and rhetorician: b. about 213 A.D.; d. Palmyra, Syria, 273 A.D. Greek literature was the principal subject of his studies. He studied the philosophy of the day under Ammonius Saccas at Alexandria, but subsequently became an ardent adherent of the Platonic philosophy, and annually celebrated the birthday of its founder by a banquet. He afterward visited the East, and on the invitation of Queen Zenobia went to Palmyra to instruct her in Greek learning and to educate her children. On the death of her husband he was employed by her in the administration of the state, and advised her to throw off the Roman yoke, by which means he was involved in the fate of this queen. For

LONGITUDE — LONGSPURS

when Zenobia was taken prisoner by the Emperor Aurelian, and could save her life only by betraying her counsellors, Longinus, as the chief of them, was seized and beheaded 273 A.D. He suffered death with all the firmness of a philosopher. He was distinguished by his oratory as well as his statesmanship and love of liberty. He appears to have known Latin and Syriac as well as Greek. The work known as 'Longinus on the Sublime,' the best piece of literary criticism in the Greek language, was written either by him or by a certain Dionysius Longinus, whose date is the 1st century after Christ.

Longitude, lön'jē-tüd, of a heavenly body, is the angle between two planes, both of which are at right angles to the ecliptic, and pass through the sun (heliocentric longitude), or through the earth (geocentric longitude). The longitude of a place on the earth is the angle between the meridian through the place and some fixed meridian. At the Geodetic Congress held in 1884 at Washington, and composed of scientific representatives from the principal countries of the world, it was resolved to adopt the meridian of Greenwich as the universal prime or first meridian, the representatives of France being the only important objectors. Longitude, or the angle between two meridians, may be measured by the arc of the equator, or of any parallel intercepted between them. As the parallels get smaller toward the poles, it is evident that degrees of longitude which are $69\frac{1}{2}$ statute miles long at the equator get shorter toward the poles. At all places of the same latitude the length of a longitude degree (measured due east and west) is the same. All methods of determining longitude are based on this fact: (1) A method formerly employed to determine the difference in longitude between two land stations was to carry chronometers backward and forward a number of times from one place to the other until the effects of variation of rate had been eliminated; comparison of their indications with the sidereal times at the places gave the longitude. (2) A ship carries a chronometer indicating Greenwich time; the local time at any place is known from observation of the sun, hence the longitude of the place may be calculated. (3) The Nautical Almanac gives the Greenwich time at which the moon is at certain distances from certain stars; mariners note the local time at which the moon is at the same distances from these stars (they are aware of the local time from observation of the sun in the daytime), and so the longitude is known. (4) The eclipses of Jupiter's satellites are seen by all observers on the earth at the same instant; their Greenwich times being noted in the Nautical Almanac, and their local times being observed as in method (3), the difference in time from Greenwich is known. The tables of these eclipses are not yet complete enough for this method to be in great use. Observations of lunar transits and the occultation of fixed stars afford other means of determining longitude. See also LATITUDE.

Longley, James Wilberforce, Canadian politician: b. Paradise, Nova Scotia, 4 Jan. 1849. He was educated at Acadia College, N. S., studied law in Halifax and was called to the bar in 1875, becoming Queen's Counsel in 1890. He was chief editorial writer for the 'Acadian Re-

corder' 1873-87, and was managing editor of the Halifax *Morning Chronicle* (1887-91). Since 1882 he has been a member of Nova Scotia Assembly and in 1886 was made attorney-general. He materially assisted the passage of the bill for the abolition of imprisonment for debt.

Long'mans, London publishers for many years identified with high-class literature. Thomas Longman (1699-1755) was apprenticed to John Osborne, bookseller, Lombard Street. Longman bought the business of William Taylor, publisher of 'Robinson Crusoe,' conducted in Paternoster Row, whence he moved in 1726 to the present site. Longman was a shareholder in many important publications, such as Boyle's 'Works,' Ainsworth's 'Latin Dictionary,' Chambers' 'Cyclopedia,' and Johnson's 'Dictionary.' His nephew and successor, Thomas Longman (1731-97), published a new edition of Chambers'. With Thomas Norton Longman (1771-1842) the firm reached a high degree of literary and commercial prosperity. Lindley Murray's 'Grammar' was published and proved valuable, while the firm had literary connection with Wordsworth, Southey, Coleridge, Scott, Moore (to whom it paid £3,000 for 'Lalla Rookh'), Sidney Smith, and other leading authors. In 1826 the 'Edinburgh Review' became the property of Longmans. The next important members of the firm were Thomas Longman (1804-79), the eldest son of T. N. Longman who issued a beautifully illustrated New Testament, and William Longman (1813-77), the third son, who wrote 'Lectures on the History of England' (1859); 'History of the Life and Times of Edward III.' (1869); and 'History of the Three Cathedrals of St Paul' (1873). The events of this generation were the publication in succession of Macaulay's 'Lays of Ancient Rome' (1842); 'Essays' (1843); and 'History.' The famous check for £20,000 paid to Macaulay as his share of the profits of the 3d and 4th volumes for the first few months (1855) is still preserved. The partners of the fifth generation were Thomas Norton Longman and George Henry Longman, sons of Thomas Longman, and Charles James Longman and H. H. Longman, sons of William Longman. One of the earliest ventures of this time was Disraeli's 'Endymion,' for which the author received £10,000. Lord Beaconsfield's other works had come into possession of the firm in 1870, when they published his 'Lothair.' A magazine—'Longman's'—was also established by the house.

Longobardi, lön-gō-bär'dī. See LOMBARDS.

Long's Peak, one of the highest elevations of the Rocky Mountains, in Colorado, about 48 miles northwest of Denver. Its height is 14,271 feet. It was named in honor of Col. Stephen Harriman Long (q.v.).

Long'spurs, a group of large finches, typically of the genus *Calcarius*, distinguished by the great size of the claw of the hind toe. All are northern birds, frequenting open lands and inclined to form into flocks. The Lapland longspur (*C. lapponicus*) is known throughout the northern parts of Europe and Asia as well as America, and breeds only in the extreme north, coming south of the area of deep snow in winter, but always rare and irregular in the United States. Three other species are restricted to

LONGSTREET—LONGUEVILLE

North America, one of which, the chestnut-collared (*L. ornatus*) is well-known in the West, as it breeds abundantly on the plains of Dakota and Montana, making its nest on the ground. All are handsome birds, with a mixture of colors, in which black, chestnut, red and buff are conspicuous. Detailed descriptions of all may be found in Dr. Coues' 'Birds of the Northwest' (1874).

Longstreet, Augustus Baldwin, son of William Longstreet (q.v.), American jurist and author: b. Augusta, Ga., 22 Sept. 1790; d. Oxford, Miss., 9 Sept. 1870. He was graduated at Yale College in 1813, began the study of law at Litchfield, Conn., and was admitted to practice in Georgia in 1815. In 1821 he represented the county of Greene in the legislature, and in 1822 was made judge of the superior court of Ocmulgee circuit. Declining re-election to the bench, he returned to the bar, and was especially distinguished for his efforts and successes in criminal cases. In 1822 he removed to Augusta, Ga., and founded the 'Sentinel.' In 1838 he entered the ministry of the Methodist church, and was president of Emory College 1839-48 and subsequently of the University of Mississippi. His works include: 'Georgia Scenes,' a series of broadly humorous sketches, long popular (1840); 'Letters From Georgia to Massachusetts.'

Longstreet, James, American soldier: b. in Edgefield district, S. C., 8 Jan. 1821; d. Gainesville, Ga., 2 Jan. 1904. He was graduated at the United States Military Academy in 1842; entered the army as lieutenant of infantry and, after performing duty at various Western posts, served in the Mexican War, in which (at Chapultepec) he was badly wounded and for gallantry in which he received the brevets of captain and major. From 1847 to 1852 he was stationed on the Texas frontier and in 1858 became paymaster with the rank of major. In June 1861, the Civil War having broken out, he resigned from the United States army and entered that of the Confederacy as a brigadier-general. At the first battle of Bull Run (q.v.) he commanded a brigade, and in 1862 was made a major-general. In the retreat before McClellan, during the Peninsular campaign (q.v.) he was in command of Gen. J. E. Johnston's rear guard, and contributed greatly to the safe withdrawal of the main army to Richmond. In the Seven Days' Battles (q.v.) he fought with credit to himself and his division, whose losses were very heavy; and at the second battle of Bull Run (q.v.) he displayed promptness, energy, and generalship to which the Confederate victory was largely attributed. He commanded the right wing at Antietam, and at the battle of Fredericksburg (q.v.) had command of the left, repulsing the desperate assault of Burnside's army. After Fredericksburg he was made lieutenant-general, and with that rank commanded one of the three corps of the Confederate army of invasion, known as the Army of Northern Virginia. At the battle of Gettysburg (q.v.) during the second and third days, he commanded the right wing, which sustained the chief burden of the conflict, furnishing the columns that made Pickett's charge. Transferred to the Army of Tennessee, Longstreet arrived on the field in time to save the day at the battle of Chickamauga (q.v.). He next

moved unsuccessfully against Burnside at Knoxville (q.v.) and early in 1864 rejoined General Lee in Virginia. Again distinguishing himself in the battles of the Wilderness, he was severely wounded and for some months disabled, but was in command of the First corps of the Army of Northern Virginia during the later months of 1864 and took some further part in active field-service, retaining to the last his distinction as a general and a fighter, and coming out of the war at its close with the respect of the whole country, which has never diminished. After the war he engaged in business in New Orleans and, having become a Republican in politics, was surveyor of customs at that port, 1869-73. In the same city he was afterward postmaster. He removed to Georgia in 1875; was United States minister to Turkey, 1880-1; in 1881-4 served as United States marshal of Georgia, and was appointed United States railway commissioner in 1898. He has written for periodicals, and has published 'From Manassas to Appomattox' (1896).

Longstreet, William, American inventor: b. New Jersey 1760; d. Georgia 1814. He settled in Augusta, Ga., in early life and on 26 Sept. 1790 wrote a letter to Thomas Telfair of Savannah asking his assistance in raising the means to construct a boat to be propelled by steam. This letter was published in the Savannah and Augusta newspapers, but funds were not immediately obtained, though he stated his entire confidence in the success of the scheme. He was subsequently furnished with the necessary means for experiment, and constructed a small model boat, upon a plan very different from Fulton's, which went on the Savannah River against the stream at the rate of five miles an hour. Cotton had previously been ginned by two rollers, not quite one inch in diameter, which caught the fibres, pressed out the seed, and delivered the clean cotton on the other side, where it was taken by the ginner's hand, and deposited in a bag attached to his person. Longstreet invented and patented the "breast roller," moved by horse power, which entirely superseded the old method. The inventor set up two of his gins in Augusta, which were propelled by steam, worked admirably, and promised him a fortune. They were, however, destroyed by fire within a week. He next erected a set of steam mills near St. Mary's, Ga., which were destroyed by the British in an invasion in the War of 1812. These disasters exhausted his resources and discouraged his enterprise, though he was confident that steam would soon supersede all other motive powers.

Longueuil, lōñ-gēl, Canada, town, in Chambly County, in the province of Quebec; on the Saint Lawrence River, and on the Canadian Pacific railroad. It is situated opposite Hochelaga, the northeastern part of Montreal. Longueuil is a residential suburb of Montreal, the country around contains many summer homes of city residents. It has Saint Anthony's orphanage and an academy for girls and one for boys. Pop. (1901) 2,835.

Longueville, Anne Geneviève de Bourbon Condé, än zhēn-vē-ēv dē boor-bōn kōn-dā lōng-vēl, DUCHESS OF, French beauty and politician: b. Vincennes 29 Aug. 1619; d. Paris 15 April 1679. Her father, Henry II., prince of Condé, was prisoner in the chateau of Vincennes

LONGUS — LOOM

at the time of her birth. Her brothers were the great Condé and the Prince of Conti. The Prince de Joinville, to whom she had been betrothed, having died, she married in 1642 the Duke de Longueville, a widower double her age. Imbibing a fondness for politics, she displayed it most actively in the part which she took in the Fronde. In order to punish the duchess, her brothers and husband were arrested by order of Anne of Austria, the regent, in 1650; but she persisted in her resistance to the court, and repaired to the citadel of Stenay in Flanders, of which she took the command, and was able to induce Turenne to join the Fronde. After the peace of 1659 she devoted herself to a religious life and her influence in Rome was said to have secured for the Jansenists the so-called peace of Clement IX. (1668). The later part of her life was spent in the Carmelite convent of Paris in most stringent observance of religious duties. Cousin, in his 'Madame de Longueville' (6th ed., 1859), calls her "the soul of the Fronde."

Longus, lōng'gūs, Greek writer, supposed to have lived about the close of the 4th or the beginning of the 5th century A.D. Concerning his history nothing is known. He was the author of a pastoral romance entitled 'The Pastorals of Daphnis and Chloe,' of which the best editions are those of Villoison (1778), Courier (1810), Passow (1811). Longus is the latest of the bucolic poets and in the Renaissance period was widely read, his pastoral descriptions, as given in Amyot's French translation, having not a little to do with the revival of the pastoral form.

Longview, Texas, town, county-seat of Gregg County; on the Texas & P., the Texas, S. V. & N., and the Great N. R.R.'s; about 240 miles northeast of Austin and 120 miles east of Dallas. It is situated in an agricultural section, in which are raised large crops of grain and cotton. The chief manufacturing establishments are foundry, lumber-mills, railroad-shops, cottonseed-oil mills, and plow-works. The principal offices of the Texas, Sabine Valley & Northwestern railroad are in Longview. The trade is principally in agricultural products, live stock, hides, cottonseed-oil, and lumber. Pop. (1890) 2,034; (1900) 3,591.

Long'worth, Nicholas, American wine manufacturer and horticulturist: b. Newark, N.J., 16 Jan. 1782; d. 1863. At 21 he went to the then unimportant settlement of Cincinnati, where he studied law. After 25 years' experience at the bar he retired from professional life in order to devote himself to the cultivation of the grape, with a view of manufacturing wine. At first his efforts were unsuccessful from his having adopted the erroneous notion of the early American vine growers, that foreign plants were alone to be relied upon. He had imported many different species from every vine-growing country in Europe before trying those indigenous to the United States. About 1828 he commenced the experiment, and became a high authority in vine culture, being not infrequently called the "Father of American Grape Culture."

Lönnrot, lén'röt, Elias, Finnish philologist: b. Sammatti, in Nyland, 9 April 1802; d. there 19 March 1884. Recognizing the value of the people's songs and ballads for Finnish language

study, he spent years in collecting such material in Finland, Lapland, and adjoining provinces, and published the fruits of his researches in a series of volumes. Among his "finds" is to be numbered the great popular epic 'Kalevala,' of which only a few cantos were previously known to the learned world. He wrote a 'Finnish-Swedish Dictionary' (1866-80). See KALEVALA.

Loo (short for lanterloo, from the Dutch name), a game of cards played with five (sometimes three) cards, dealt from a whole pack, either by threes and twos, or one at a time. After dealing, a card is turned up for trumps. The jack of clubs, or the jack of the trump suit, as agreed on, is the highest card, styled "pam"; the ace of trumps is next, and then the other cards as in whist. Five cards of a suit, or four with "pam," compose a "flush," which sweeps the board, and yields only to a superior flush, or the elder hand. When the ace of trumps is led, it is usual to say, "Pam be civil"; the holder of the jack (of trumps or clubs; see above) is then expected to let the ace pass. Each player has the liberty of changing his cards for others from the pack, or of throwing up the hand, in order to escape being looed, that is, failure to gain a trick. All those that win tricks divide the pool or "loo," to which on entering the game each player contributes chips (usually three) in proportion to the tricks taken. Every player who is looed must again contribute a stake, which, with the dealer's stake, forms a new pool.

Loo'-choo Islands. See LIU-KIU ISLANDS.

Loo'fah, Egyptian, the fibrous portion of the fruit of one or two species of the genus *Luffa* of the gourd family, sold for use as a bath-sponge or flesh-rubber. There are about 10 species of the genus known, but the "towel gourd," as this bath-sponge is sometimes called, appears to be obtained chiefly from *L. aegyptiaca*. In the West Indies the fruit of *L. acutangula* yields a similar network of fibres, and is there used as a sponge or dishcloth, and worked up into baskets and small ornamental articles.

Looking Backward, 2000-1887, a romance by Edward Bellamy, published in 1888. It had a sale of nearly 400,000 copies in the next ten years, and is still in demand. It recounts the strange experiences of Julian West, born in 1857, who in 1887 is put into a hypnotic sleep. In the year 2000, Dr. Leete, a retired physician, is conducting excavations in his garden, when West's subterranean chamber is disclosed. The doctor discovers and resuscitates the young man, who finds himself in a regenerated world.

Lookout Mountain. See CHATTANOOGA, BATTLE OF.

Loom, a term originally meaning simply "tool," but now particularized so as to apply to a machine for weaving. The simplest form of the loom, still in use among semi-primitive tribes and up to the middle of the 18th century practically the only form, was the hand loom, a rectangular frame,

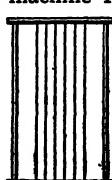


FIG. I.

frame, from one side of which yarn is stretched to the opposite side, where it is so secured that the transverse threads may be passed by hand "over and under" the threads already stretched. Fig. I

LOOMIS

shows the simplest form of this loom. The form in commoner use in civilization up to Cartwright's invention of the power loom in 1785 is merely this same actual frame set in a skeleton box (AAAA) in a horizontal position (Fig. 2). The end pieces of the actual frame are now rollers, so that the length of the piece of cloth is no longer necessarily less than the length of the frame. These rollers are the beam or yarn-roll (B), which is at the back of the loom, and upon which the warp threads are wound, and the cloth beam (C) to which the threads are fastened and which winds up the cloth as it is made. The threads of the warp, held tight by weights (b, b), pass through the eyes of the heddles (or healds), thus being separated to permit of the passage of the shuttle, and also through the reed. The shuttle in the hand-loom is thrown by the operator, and in the power loom by the picker-staff machinery; in either case it is made of hard wood, is pointed at either end and carries in a recess the quill or bobbin.

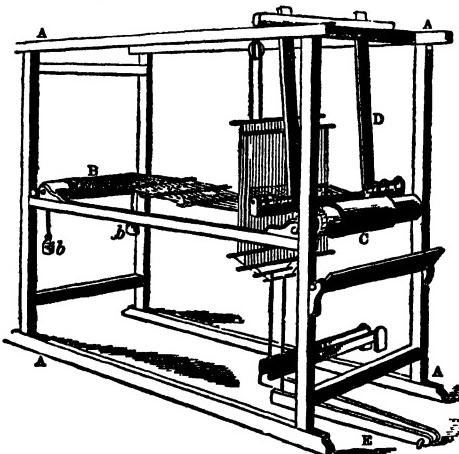


FIG. 2.

This hand-loom was first successfully improved, after the unfortunate attempts of De Gennes in 1678, by Edmund Cartwright, who undertook in 1785 to counterfeit by mechanical means the three simple motions of weaving. He had neither mechanical nor textile training, but his loom though cumbersome and awkward is essentially that now in use. The simplest modern loom differs essentially from the hand loom in that the warp yarn is no longer stretched direct from the yarn roll to the cloth beam, and these two parts are no longer placed at the same height from the base of the frame nor at so great a distance as before. The yarn runs upward from the warp-beam over the whip-roll, thence is carried through heald, heddle, or (the American term) harness, and through the reed, and down from the latter to the cloth roll. The advantage of this arrangement is greater stability and a distinct saving in space, the depth of the loom being materially decreased. With the old fashioned heddle only the simplest and most regular webs could be woven; for figured patterns the most effective mechanism is the Jacquard attachment, patented by a weaver of Lyons, Joseph Marie Jacquard, in 1801. This machine lends itself readily to use with any loom. It may be described as a means of forming the

shed and governing the heddle,—in fine, it takes the place of the weaver's fingers. A revolving drum or cylinder is so perforated as to catch some or all needles, which in turn govern a set of perpendicular hooks. These hooks guide the threads of the warp, so that the weaving is no longer of necessity simply "under or over." How many threads are to be skipped is determined by a perforated card-board, the perforations occurring where the thread of the warp is to lie above the filling; but if the warp-threads are not to be raised no holes are cut in the cards, the needles do not enter the cylinder, and the hook attached to the needle does not lift, by means of its neck-cord or loop of twine, the thread of the warp. A series of these cards, each with different perforations, makes an almost infinite combination of patterns possible, as each card makes a different shed.

The hand loom is still used for the manufacture of rugs and fine carpets, but the power loom, driven by various powers, electricity being the latest and in some ways the most economical, is used for almost any purpose. The ribbon-loom, for instance, weaves simultaneously a number of narrow pieces. Many attachments, invented in a long series, have continuously and wonderfully decreased the need of any supervision of the loom, making it more and more automatic: thus a shuttle protector automatically stops the machinery if the shuttle fails to fly all the way across the warp; the filling stop motion protects the machinery from running on uselessly when the filling breaks or runs out; and take-up, let-off, and warp-stop motions are further automatic devices. The highest pitch of automatic attachment is the Northrop patent, which is a hopper full of loaded bobbins; these are fed into the place of the empty bobbins as soon as the yarn is exhausted.

See Posselt, 'Textile Machinery' (1901) and 'Jacquard Machine Analyzed and Explained' (1893); and Barlow, 'History and Principles of Weaving by Hand and by Power' (1879).

Loomis, Alfred Lebbeus, American physician: b. Bennington, Vt., in 1833; d. 23 Jan. 1895. He was graduated at Union College in 1851, and studied medicine in New York city at the College of Physicians and Surgeons, where he was graduated in 1852. He gave his attention to diseases of the lungs at a time when auscultation and percussion were acquiring great scientific importance in medical practice, and in the treatment of such diseases became an efficient specialist. In 1859 he was appointed visiting physician to Bellevue Hospital, New York, and was made lecturer on physical diagnosis at the College of Physicians and Surgeons in 1862. Having spent some months in the Adirondack Mountains for the improvement of his health, in later years he established the Sanitarium at Saranac and the Hospital for Consumptives at Liberty, N. Y. In 1866 he accepted the professorship of theory and practice of medicine at the University of the City of New York, remaining in connection with that institution until his death. The work done by him for its medical department was of great and lasting importance, as were also the services he rendered to the New York Academy of Medicine. In 1874 he was appointed visiting physician to Mount Sinai Hospital: was president of the New York Academy of Medicine, 1899-90 and 1901-2. His publications include 'Lessons in Physical Diag-

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nosis' (1870); 'Lectures on Fevers' (1877); and 'A Text-book of Practical Medicine' (1884). He also edited 'An American System of Medicine' (1894).

Loomis, Charles Battell, American humorist: b. Brooklyn, N. Y., 16 Sept. 1861. He was educated at the Brooklyn Polytechnic Institute and held a business clerkship 1879-91. He is a frequent contributor to periodicals and has published 'Just Rhymes' (1890); 'The Four-Masted Cat-boat' (1890); 'Yankee Enchantments' (1900); 'A Partnership in 'Magic' (1903).

Loomis, Chester, American painter: b. near Syracuse, N. Y., 18 Oct. 1852. He was educated at Cornell University (1868-71); studied painting at Paris under Léon Bonnat, and after a residence of 11 years in France opened a studio at Englewood, N. J. He is favorably known as a figure and landscape painter and his pictures are found in many private collections. His 'Christopher Sly' was awarded a gold medal at the Massachusetts Charitable and Mechanics' Institution Exhibition and was subsequently purchased by the Indianapolis Art Association.

Loomis, Elias, American physicist: b. Willington, Conn., 7 Aug. 1811; d. New Haven, Conn., 15 Aug. 1899. He was graduated at Yale College in 1830, and was tutor there in 1833-6. He was the first person in America to obtain a view of Halley's comet, at its return in August 1835, and his observations on that body, with a computation of its orbit, were published in the 'American Journal of Science.' After a year's study in Paris he was professor (1837-44) of mathematics in Western Reserve College, Ohio, of natural philosophy (1844-60) in the University of New York, and of natural philosophy and astronomy (from 1860) at Yale. He devoted much of his time to original research, wrote more than 100 scientific treatises, and published a series of text-books on mathematics, natural philosophy, astronomy, and meteorology, of which more than 500,000 copies were sold. Among his publications were: 'Elements of Algebra'; 'Elements of Geometry and Conic Sections'; 'Recent Progress in Astronomy.'

Loomis, Francis B., American journalist and diplomatist: b. Marietta, Ohio, 27 July 1861. He was a graduate from Marietta College, and in 1883 joined the staff of the New York *Tribune*. He was state librarian of Ohio 1885-7; consul at St. Etienne, France, 1890-3, and editor-in-chief of the Cincinnati *Daily Tribune* 1893-6. He was United States envoy-extraordinary and minister plenipotentiary to Venezuela, 1897-1901, and while there was active in promoting the interests of American commerce in South America. He filled the same diplomatic position at the court of Portugal 1901-03, and became assistant secretary of state in January 1903.

Loomis, Gustavus, American soldier: b. Thetford, Vt., 1789; d. 1872. He was graduated at West Point and received his commission as sub-lieutenant of artillery in 1811. He saw service on the Niagara frontier from 1812 to 1813, in which latter year he took part in the capture of Fort George (May 27) and was made prisoner the following December at Fort Niagara. During the war with Great Britain, the Black Hawk war, and the campaign against

the Seminole Indians, he held important commands, and after the Civil War, in which he served as superintendent of the general recruiting service, was retired with rank as colonel of infantry. In 1865 he received the brevet of brigadier-general of the United States army.

Loomis, Lafayette Charles, American author and educator: b. North Coventry, Conn., 7 July 1824. He was graduated from Wesleyan University, Conn., in 1844, and was successively president of colleges at Wilmington, Del., and Wheeling, W. Va., and later medical professor at Howard University, Washington, D. C. He has published 'Mizpah' (1859); 'Mental and Social Culture' (1868); 'Index Guide to Travel and Art Culture in Europe' (1880); 'Myself' (1894).

Loomis, Silas Lawrence, American scientist and inventor: b. Coventry, Conn., 1822. He was graduated from Wesleyan University in 1844, from the medical school of Georgetown University in 1856, and was professor of physiology at Georgetown in 1859-60. In 1857 he was appointed astronomer to the United States coast survey, in 1860 instructor in mathematics to naval cadets, in 1861-7 was professor of chemistry and toxicology at Georgetown, and subsequently occupied a chair at Harvard. Among his inventions are a process for manufacturing a textile fabric from the palmetto, and another for making profitable use of chromium ores. He wrote text-books of arithmetic, a 'Key to the Normal Course' (1867), and other works.

Loon, lō-ōn', Philippines, a pueblo of the province of Bohol, situated on the west coast, 13 miles north of Tagbilaran, and opposite Dala-guete, Cebu. A mole 328 yards long, protecting the harbor, extends to the town, which is reached by steps cut in the rock. It is picturesquely situated on the slope of the Cammanoc hills, and has an old Spanish fort with bastions. It is centrally located for trade, and is the largest town in the province. Pop. 15,400.

Loon. See DIVER.

Loos, 16s, Charles Louis, American educator: b. Woerth-sur-Sauer, Basse-Alsace, France, 23 Dec. 1823. He came to the United States in 1832, and settled at New Franklin, Ohio, where he studied English, became connected with the Disciples of Christ in 1858 and preached at 17. He was graduated from Bethany College in 1846, where he was professor of ancient languages 1858-80. He was president of Kentucky University 1880-97. In 1849 he was ordained to the ministry of the Disciples and has been of great prominence in his denomination.

Loosestrife, a plant of the genus *Lysimachia*, of the primrose family, about 40 species of which grow in the temperate zone. Several yellow-flowered species belong to the United States, but those best known are the whorled or four-leaved (*L. quadrifolia*), and the bulb-bearing, *L. terrestris*. Two or three species, especially *L. nummularia*, popularly known as moneywort, creeping Charley and creeping Jenny, have been introduced from Europe. One kind is eaten in India as a pot-herb with fish. "Again and again," says Miss Lounsbury, in her 'Southern Wild Flowers and Trees,' "we come across the loosestrifes during our summer and early autumn rambles. And soon we learn to associate with them their opposite, or

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whorled, leaves, always entire, and their upright, rather stiff manner of growth, and very frequently we look for their petals to be darkly spotted near the bases. In personality the genus reminds us somewhat of the St. John's-wort, but we think of the latter as being usually freer, more prolific bloomers. The old and pretty legend concerning our present plants is that they loose strife; that they act as peace-makers especially among cattle that are quarrelsome. Believing this, people in the old country used to tie such a spray to their yokes before starting out on a long journey."

The name loosestrife is also given to species of the genus *Lythrum*, which some botanists place in the order *Primulaceæ*, of which about a dozen species are widely distributed in temperate climates. They are characterized by four-angled stems, usually opposite leaves which are sometimes whorled, and reddish-purple or white flowers, solitary above and whorled lower down the stems. Some are cultivated for ornament in borders and among shrubbery, where they succeed well. The best-known species is the purple loosestrife (*L. salicaria*), which is frequently planted.

Lope de Vega, lō pā dā vā'gā. See VEGA, CARPIO.

Lopes, lō'pāsh, Caetano, Brazilian historian: b. Bahia October 1780; d. Paris 22 Dec. 1860. He was a mulatto and after obtaining an education in Bahia and Paris, France, settled in the latter place in 1822 and became corresponding member of the Academy of Inscriptions and Belles-lettres. The Emperor Pedro held him in high esteem and the Historical Institute of Rio Janeiro bestowed him its gold medal. He was conspicuous for brightness of style and purity of language. His works, which are numerous, treat of history, biography, and surgery.

Lopes, or Lopez, Fernao, Portuguese chronicler: b. about 1380; d. after 1459. He was appointed chief archivist of the kingdom by Dom Joao I. in 1434, and spent his life in historical research and the composition of chronicles, which for literary and critical value were unsurpassed in his century. His 'Chronicle of Señor Don John I.' describing the great struggle between Portugal and Castile, invites comparison with Froissart's chronicle on account of its picturesqueness and dramatic reality. Equally vigorous are his chronicles of Dom Pedro I. and Don Fernando.

Lopez, lō'pāz or lō'pāth, Carlos Antonio, President of Paraguay: b. near Asuncion about 1795; d. there 19 Sept. 1862. He was educated in Asuncion and became noted for his legal acquirements. After the death of President Francia, in 1840, he was secretary of the junta which controlled Paraguay for a few years. In March 1844 the Paraguay congress adopted the constitution he had drawn up and elected him president of Paraguay for ten years. He was re-elected for three years in 1851; and again in 1857 for seven. He followed Francia's policy in the main and became involved in quarrels with foreign nations. In 1859 the United States sent a naval force to the Plata to enforce demands against him. He offered to submit the question of damages to arbitration, but afterward evaded the claim.

Lopez, Francisco Solano, Paraguayan president: b. Asuncion 24 July 1827; d. near the Aquidaban 1 March 1870. He was the son of Carlos Antonio Lopez (q.v.), then president. In his 18th year his father made him a brigadier-general in the war against Rosas, the dictator of Buenos Ayres. He afterward filled some of the principal offices of state, and was sent to Europe in 1853, accredited to the chief courts there. In 1855 he returned to Paraguay, became minister of war, and on the death of his father, in 1862, president for ten years. He had aimed at the foundation of a great inland empire, and as his military preparations were now complete, and his army superior to that of any of the South American states, he began hostilities against Brazil in 1864. The Argentine Republic and Uruguay allied themselves with Brazil, and after five years' conflict Lopez was reduced to extremities, and was finally surprised on the banks of the Aquidaban by a troop of Brazilian cavalry and slain. The latter part of his career had been stained by many cruelties and wanton murders. Consult: Thompson, 'The War in Paraguay' (1869); Masterman, 'Seven Eventful Years in Paraguay' (1869); Burton, 'Letters from the Battle Fields of Paraguay' (1871); Washburn, 'History of Paraguay' (1871); Schneider, 'Der Krieg der Triple-Allianz' (1872-5).

Lopez, José Hilario, hō-sā' hē-lā'rē-ō, Colombian politician: b. Popayan 18 Feb. 1798; d. Neiva 27 Nov. 1869. He was president of New Granada (Colombia) from 7 March 1849 to 7 March 1852, and in the last named year slavery was abolished and changes were made looking to the formation of a federal government. In the revolutions of 1854 and 1859-62, he fought with the Federalists and was commander-in-chief for part of this period. He was a member of the provisional government 1862-3, and subsequently President of Tolima. In 1867 he was named commander-in-chief of the army. *

Lopez, Narciso, Cuban revolutionist: b. Venezuela 1799; d. Havana, Cuba, 1 Sept. 1851. He served for some time in the Spanish army, from which he retired in 1822 with the rank of colonel. After the evacuation of Venezuela by the Spanish troops, he established himself in Cuba, and afterward during a stay at Madrid joined the party of Isabella against Don Carlos, and became successively adjutant of Valdes, governor of the Spanish capital, and senator for Seville, but threw up his offices after the refusal of the Cortes to admit the representatives of Cuba. Valdes became governor-general of that island, and Lopez on returning thither was employed by him in various capacities. He was soon absorbed by the project of throwing off the yoke of Spain, and he proceeded in 1849 to the United States, where he sunk almost his whole fortune in the organization of three successive expeditions to Cuba: the so-called Round island expedition in 1849; the "invasion of Cardenas" expedition in May 1850, both of which failed, and the Bahia-Honda expedition, of August 1851, which ended fatally. Lopez, with several hundred persons of different nationalities whom he had enlisted in various parts of the United States, landed at Morillo, near Havana, where he left 200 of his men under the command of Colonel Crittenden, who were taken by the

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Spaniards and shot. Lopez went to Las Pozas, where he succeeded in repelling an attack of the Spanish soldiers; but, isolated from his friends, sought refuge in the mountains, where he was captured and taken to Havana. He was sentenced to death, which he met with great firmness.

Lopez, Vicente Fidel, Argentine historian: b. Buenos Ayres 1814. He is a son of Vicente Lopez y Planes (q.v.). He became rector of the University of Buenos Ayres and has published 'Razas del Perú anteriores a la Conquista'; 'Historia de la República Argentina'; 'Tratado de Derecho Romano'; etc.

Lopez, Cape. See CAPE LOPEZ.

Lopez de Ayala, Pedro, pā'drō, Spanish ardo, Spanish dramatist: b. Seville district 1 May 1828; d. Madrid 30 Jan. 1879. He was educated at the University of Seville, and at Madrid in 1851 had his first drama, 'El Hombre de Estado,' produced. In 1857 he was elected deputy from Badajoz to the Cortes, and subsequently he was a member of Alfonso XII's first cabinet. He was the author of numerous lyrics which take excellent rank in Spanish literature, especially of the 'Epistola.' But he was better known as a dramatist of high literary and popular success. Chief of his plays are 'Tanto por Ciento' (So Much per Cent), which was recognized by the bestowal upon him of a gold crown, and 'Consuelo.' Both are searching arraignments of the principles of modern life.

Lopez de Ayala, Pedro, pā'drō, Spanish poet: b. Murcia 1332; d. Calahorra 1407. He served well Henry II, John I., and Henry III., kings of Castile, attained the highest dignities, including those of lord chancellor and high chamberlain of Castile, and wrote the 'Cronicas de los Reyes de Castilla' ('Chronicles of the Kings of Castile') (1780), which covers the period from King Peter to Henry III. In this work he strove to substitute for the dry record of the historiographers a pragmatic account of historical events. He also wrote lyrics, and the 'Rimado de Palacio' ('Rime of the Palace'), a satiric poem on political and social questions.

Lopez y Planes, lō'páz or lō'páth ē plā'nés, Vicente, Argentine poet: b. Buenos Ayres 1814; d. there 1856. He was prominent as a soldier and politician, was member of Congress, 1819-25, and provisional president of the republic, 5 July to 13 Aug. 1827. He presided over the supreme court of justice, and was governor of the province of Buenos Ayres. He was the author of the 'Argentine National Hymn' and other poems.

Lophiodon, an extinct tapir-like animal, found in the Eocene fresh-water deposits of central Europe. The genus is typical of a family (*Lophiodontidae*) which includes also the genera *Hyracotherium*, *Hyracus*, *Systemodon* and *Orohippus*, and is a very generalized group probably ancestral to the rhinoceroses. Consult Woodward, 'Vertebrate Paleontology' (1898).

Lophobranchii, lō-fō-brang'ki-i, a suborder of bony fishes, including the "sea-horses" and "pipe-fishes" (*Syngnathidae*). See ICHTHYOLOGY.

Loquat lō'kwat, or Japan Plum, a shrub or small tree (*Eriobotrya japonica*) of the natural order Rosaceæ. It attains heights of about 20 feet, bears thick evergreen leaves near the

ends of the branches, and fragrant, woolly, whitish flowers in terminal panicles in late summer and autumn, followed by downy yellow oval or pyriform fruits (pomes) which ripen in very early spring. The fruits, which in favorable climates are borne in profusion, are highly esteemed for their sub-acid flesh and their pleasantly flavored seeds, the former being used as a dessert, the latter for flavoring cookery. The tree is a native of Japan and China, whence it has been taken to subtropical climates throughout the world. In the Gulf States and in California it is widely popular as a home fruit, though it appears in northern markets. In California several highly improved varieties were produced during the closing decade of the last century. In the north it is often grown in conservatories.

Lorain, lō-rān', Ohio, city, in Lorain County; on the south shore of Lake Erie, at the mouth of the Black River, and on the New York C. & St. L. (Nickel Plate), Baltimore & O., and Lake Erie & Pittsburg R.R.'s; about 26 miles west of Cleveland. The first permanent settlement was made in 1822 by Barney Meeker. It was incorporated as a village in 1873 and as a city in 1895. It is an agricultural and natural-gas region, and is a shipping port for farm products, for the output of the Central Ohio coal fields, and for the lumber and iron ore of a large section of the State. The chief industries of the city are ship-building, coal shipping, manufacturing steel, general manufacturing, and fishing. The Lorain Steel Company employ about 4,000 people; the American Shipbuilding Company, 1,300; the Baltimore & Ohio, in shops, at docks, etc., 1,000; small industries, about 2,000. The city has excellent public and parish schools, a public library, 22 churches, and Saint Joseph's Hospital. There are five banks with a combined capital of \$300,000. The annual amount of business is about \$2,500,000. About 75 per cent. of the inhabitants are American born. The government is vested in a mayor, a board of public service (three members), and a council of seven members. Four of the council are elected one from each ward, and the other three, at large. The board of education, waterworks trustees, and marshal are chosen by popular election; the board of health are chosen by the council; the police are appointed by the mayor subject to approval by the council. The waterworks are owned and operated by the city. Pop. (1890) 4,863; (1900) 16,028. F. A. ROWLEY,

Editor of 'Times Herald.'

Lorca, lōr'kā, Spain, city, in the province of Murcia; on the Sangonera River; about 20 miles north of Aguilas, the Mediterranean port. It is an ancient city, established before the Moors came to Spain, as is evidenced by the older houses; but the main part of the city now existing is of Moorish construction. It has considerable manufacturing interests, and in the vicinity are valuable mines of silver, sulphur, and lead. The farms in the surrounding country have to be irrigated in the dry seasons, and for the storage of water of the Sangonera a dam, 800 feet long and 160 feet high, was built near the city. In 1802 the dam burst, and the valley was flooded. Many lives and much property were lost. Lorca was the scene of many battles between the Christians and the Moors. Pop. 70,127.



